



# FREEZERS

**POLAR 110 H / POLAR 110 SH  
POLAR 180 H / POLAR 180 SH  
POLAR 370 H / POLAR 370 SH  
POLAR 340 V / POLAR 340 SV  
POLAR 530 V / POLAR 530 SV  
POLAR 550 H / POLAR 550 SH**



PO1207-F01



PO1207-F17



## Installation, use and maintenance handbook

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464 Località Cimacolle  
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## AVVERTENZA IMPORTANTE

I prodotti realizzati dal costruttore sono caratterizzati da un elevato contenuto tecnologico che talvolta richiede un adattamento tecnico di parti o componenti altrimenti reperibili sul mercato nella loro versione standard commerciale. Pertanto, la sostituzione di parti o componenti con altri non originali, ossia non forniti e garantiti direttamente dal COSTRUTTORE, nonché l'accertamento di interventi tecnici effettuati da personale non autorizzato, comporteranno l'immediata cessazione della garanzia, se in essere, e comunque di qualsiasi responsabilità nei confronti dell'acquirente e di terzi, da parte del COSTRUTTORE stesso.

## IMPORTANT WARNING

The high level of technology of the products made by the manufacturer occasionally requires components to be adapted from parts normally found on the market in their standard commercial version. Therefore, if it should be ascertained that any parts have been replaced with other components that are not original, i.e. that have not been supplied and guaranteed directly by the MANUFACTURER, or that any unauthorised technical interventions have been carried out, the guarantee, if any is in force, shall be considered no longer valid and the MANUFACTURER himself shall no longer be held responsible towards the purchaser and towards third parties.

## AVERTISSEMENT IMPORTANT

Les produits réalisés par le constructeur sont caractérisés par un haut niveau technologique qui demande parfois une adaptation technique de parties ou de composants autrement disponibles sur le marché dans leur version commerciale standard. Pour cette raison, la substitution de parties ou composants par d'autres non originaux, c'est à dire non fournis et garantis directement par le CONSTRUCTEUR, ou bien la constatation que du personnel non autorisé a effectué des interventions techniques; auront pour conséquence l'immédiate cessation de la garantie en cours et de toute façon de toutes responsabilités du CONSTRUCTEUR vis à vis de l'acheteur ou de tierces parties.

## WICHTIGE WARNUNG

Das hohe technische Niveau der Produkte des Herstellers erfordert teilweise Komponenten, die verändert werden müssen gegenüber handelsüblichen Produkten ; wie sie am Markt zu finden sind.  
Beim Austausch von Teilen oder Komponenten; die nicht dem Orginal entsprechen, das heißt nicht direkt vom HERSTELLER geliefert und garantiert wurden, bzw. daß technische Veränderungen durch nicht autorisiertes Personal vorgenommen wurde, gilt die Garantie, falls noch in Kraft, als erloschen und der HERSTELLER kann nicht mehr länger haftbar gemacht werden gegenüber dem Käufer und Dritten.

## AVISO IMPORTANTE

Los productos elaborados por el fabricante se caracterizan por un alto nivel tecnológico y ocasionalmente requieren adaptaciones técnicas de partes o componentes que normalmente se encuentran en el mercado en su versión comercial estándar.  
Por tanto, la sustitución de partes o componentes, por otros que no sean originales, es decir no suministrados y garantizados por el FABRICANTE, o bien se constata la intervención técnica por de personal no autorizado, supondrá el cese inmediato de la garantía, si está en vigor, así como de cualquier otra responsabilidad del FABRICANTE de cara tanto al comprador como a terceras personas.



**Angelantoni**  
INDUSTRIE SPA

MORE THAN TECHNOLOGY  
464 Località Cimacolle  
06056 Massa Martana (Pg) Italy

## DICHIARAZIONE DI CONFORMITÀ DECLARATION OF CONFORMITY



Denominazione prodotto:POLAR  
Product Name

Ordine / Serie N.  
Order/series N°

Costruttore  
Manufacturer



Mandatario  
Agent



La macchina è conforme ai dettami delle seguenti Direttive CEE:

- Direttiva Macchine n° 98/37, successive modifiche e DPR 459/96.
- Direttiva Bassa Tensione n° 73/23 e successive modifiche.
- Direttiva Compatibilità Elettromagnetica n° 89/336 e successive modifiche.

*The machine complies with the regulations in the following EEC Directives:*

- Machinery Directive n° 98/37, subsequent modifications and DPR 459/96.
- Low Voltage Directive n° 73/23 and subsequent modifications.
- Electromagnetic Compatibility Directive n° 89/336 and subsequent modifications.

**In particolare soddisfa le seguenti Norme Armonizzate:**

- EN 292-1 Sicurezza del macchinario - Concetti fondamentali, principi generali di progettazione - Parte 1: Terminologia, metodologia di base. 1991.
- EN 292-2 Sicurezza del macchinario - Concetti fondamentali, principi generali di progettazione - Parte 2: Specifiche e principi tecnici. 1991.
- EN 294 Sicurezza del macchinario - Distanza di sicurezza per impedire il raggiungimento di zone pericolose con gli arti superiori. 1992
- EN 61326-1 Apparecchi elettrici di misura, controllo e laboratori. Prescrizioni di compatibilità elettromagnetica. - Parte 1: Prescrizioni generali e successive modifiche.
- EN 61010-1 Prescrizioni di sicurezza per apparecchi elettrici di misura, controllo e per utilizzo in laboratorio - Parte 1: Prescrizioni generali.

**In particular it complies with the following Standardized Norms:**

- EN292-1 Safety of machinery - Fundamental concepts, general principles for design - Part 1: Terminology, basic methodology, 1991.
- EN292-2 Safety of machinery - Fundamental concepts, general principles for design - Part 2: Technical specifications and principles. 1991.
- EN294 Safety of machinery - Safety distance to prevent upper limbs coming into contact with dangerous areas. 1992.
- EN61326-1 - Electrical equipment for measurement, control and laboratory use EMC requirements - Part. 1 - General requirements.
- EN61010-1 Safety instructions for electrical apparatus to measure, and control and for laboratory use - Part 1: General instructions.

Data \_\_\_\_\_  
Date \_\_\_\_\_

L'amministratore delegato  
Managing Director

Gianluigi Angelantoni



## DICHIARAZIONE DI CONFORMITÀ DECLARATION OF CONFORMITY

Modello:POLAR  
*Type*

Matricola  
*Serial number*

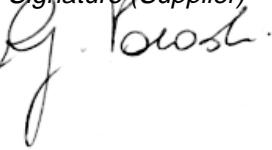
Da (Fornitore)  
*From (Supplier)*

ANGELANTONI INDUSTRIE S.p.A.  
Loc. Cimacolle  
06056 Massa Martana (Pg) - Italia

Si certifica che la totalità delle forniture sopraelencate è conforme in ogni parte alle specifiche, ai disegni e all'ordine cui si riferiscono e che le forniture sono state verificate e provate in conformità con le condizioni ed i requisiti dell'ordine e in particolare alla Direttiva 93/42.

*We certify that all the supplies mentioned in this document comply in any detail with the specifications, with the drawings and with the purchase order refer to. We also certify that the supplies have been checked and tested according to the order conditions and requirements and particularly to 93/42 law.*

Data  
*Date*

Firma (Fornitore)  
*Signature (Supplier)*  


ANGELANTONI INDUSTRIE S.p.A.  
Nome (Stampatello) - *Printed name*  
Il Responsabile Qualità - *Quality Manager*

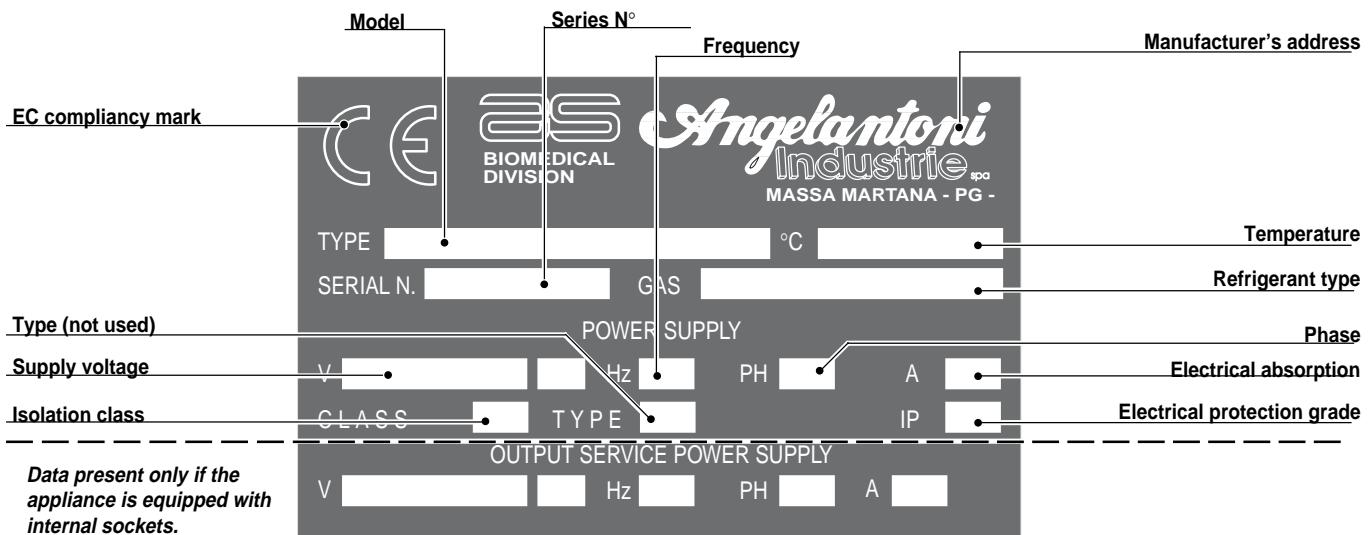
Dott.ssa - Miss Gabriella Parodi

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# 1 SUMMARY OF RATING PLATE DATA

- Find the special rating plate on the machine in order to check the technical data.
- Check the machine model and supply voltage before carrying out any operation whatsoever.
- If you find any discrepancies, contact the manufacturer or your supplier immediately.



## 2 WARNINGS

### 2.1 GENERAL WARNINGS

- Do not carry out any operations or manoeuvres unless you are absolutely certain of their effect; if in doubt, contact your nearest technical assistance service or the manufacturer himself.
- The manufacturer will not be held responsible for damage to the machine or to objects in the following cases:
  - improper use of the machine
  - use of unsuitable personnel
  - incorrect assembly and installation
  - defects in the plant systems
  - unauthorized modifications or operations to the machine
  - use of spare parts that are not original pieces
  - failure to comply with the norms given in this handbook
  - exceptional events
- This instruction handbook has been designed for the following personnel:
  - Personnel in charge of transport, handling and removal of packaging
  - Personnel in charge of the preparation of the plant systems and installation site
  - Installers
  - Personnel in charge of using the machine
  - Personnel in charge of maintenance
- The instruction handbook indicates the use foreseen by the manufacturer and cannot ever replace adequate experience of the operator. It can only be used as a reminder of the main operations to be carried out.
- The instruction handbook should be kept carefully and should also be within easy reach for reference. If necessary, photocopy the pages concerned directly with machine use. The handbook should last at least the life-time of the machine itself.
- The instruction handbook gives technical information on how the machine is manufactured at the present time; the manufacturer reserves the right to carry out any modifications he deems necessary to the machines and to the instruction handbooks, without prior notice or replacement.

This machine is not referred to in enclosure IV of the community norm on machines, and therefore the procedure in article 8, paragraph 2, letter A in the Community norms for machines 89/392/CEE and 91/368/EEC has been applied. Article 8, paragraph 2, letter A of the Community norms for machines 89/392/CEE and 91/368/EEC obliges the manufacturer to provide the file foreseen by the enclosure of the afore-mentioned laws, and to store it in the technical archives of the company Angelantoni Industrie spa, località Cimacolle, Massa Martana, Perugia.

This handbook should last at least as long as the machine itself. It is, therefore, a good idea to always keep it in its holder. If you lose or destroy the handbook, you may ask for a copy. Please give the rating plate data (see chap. 1) in your request.

## 2.2 WARNINGS FOR TRANSPORT AND HANDLING

- This symbol, placed on each packaging, indicates the weight of each package.  
Always check that the tools and machines to handle and transport the machine are adequate.
- Always keep the machine in an upright position. If the machine should accidentally turn upside-down or on its side, do not switch it on. Put it in the correct position and contact the manufacturer.

## 2.3 WARNINGS FOR INSTALLATION

- Installation should always be carried out by specialized personnel.
- Carefully follow the instructions on how to prepare the plant systems before installing the machine.
- When the installation site is being prepared, bear in mind the space and work conditions of the personnel in charge of the machine so as to reduce to a minimum noise, fatigue, discomfort and anything else which may have a negative influence on the staff.
- When designing the installation site, remember to leave sufficient space for control, maintenance, cleaning, and removal of production waste material.
- Make sure there are clear notices near the machine to warn personnel who are not in charge of the dangers within the work range of the machine during the work cycle.
- Make sure that the work site is adequately lit so that personnel can work in optimum conditions.
- When designing the installation site, please refer to the norms in force and in particular:
  - set up all the firefighting and safety devices.

## 2.4 WARNINGS FOR PERSONNEL IN CHARGE OF THE MACHINE

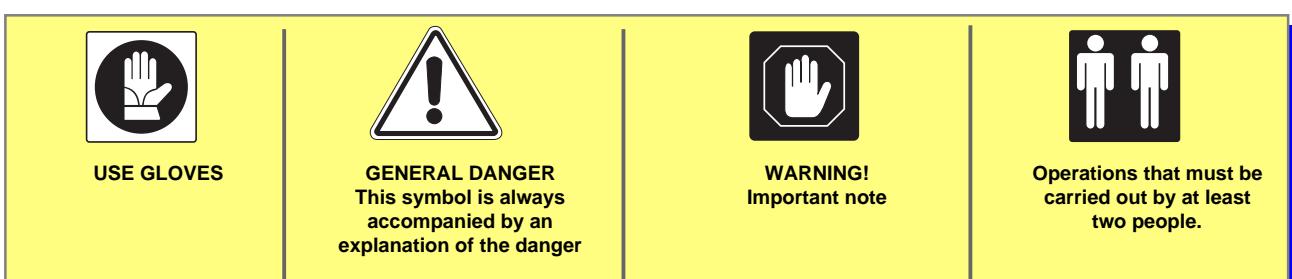
- The machine may only be used by personnel who have read the rules described in this handbook.
- If the chamber is opened in temperatures that differ greatly from ambient temperatures, problems could be created: if the internal temperature is high, it will be very difficult to close the door because of expansion; if the internal temperature is very low, phenomena of condensate and frosting due to ambient humidity could occur. If the door is opened frequently in these conditions, it is not only dangerous but could cause damage to the gaskets of the door and could obstruct the thermal exchangers.

## 2.5 WARNINGS FOR MAINTENANCE

- Always disconnect the machine from electrical mains supply (models supplied with electrical equipment) and release pressure before carrying out any maintenance operation whatsoever.
- Always close all the stop valves above the machine.
- Do not use solvents or alcohol to clean the varnished parts as these products could damage the surface.

## 2.6 EXPLANATION OF SYMBOLS

- The symbols shown below may be found on the machine or in this instruction handbook.
- Pay attention to their meaning before going any further.



### 3 TECHNICAL SPECIFICATIONS

#### 3.1 TECHNICAL DATA

Model	POLAR 110 H	POLAR 110 SH	POLAR 180 H	POLAR 180 SH	POLAR 370 H	POLAR 370 SH
External dimensions (LxDxH) (mm)	730x960x1080	730x960x1080	850x980x1080	850x980x1080	1780x910x1020	1780x910x1020
Internal dimensions (LxDxH) (mm)	450x560x450	450x560x450	570x700x450	570x700x450	1050x520x670	1050x520x670
Useful volume (l)	113	113	180	180	366	366
Temperature range (°C)	-40 -85	-20 -45	-40 -85	-20 -45	-40 -85	-20 -45
Temperature variations inside the space (1) (°C)	±3	±2	±3	±2	±3	±2
Temperature fluctuations over time (1) (°C)	±2	±1	±2	±1	±2	±1
Supply voltage	230 V (+ 6 / - 10%) / 50 / 1 + G					
Rated output (kW)	0,66	0,33	0,66	0,33	0,66	0,33
Absorbed current (A)	3	1,5	3	1,5	3	1,5
Thermal dissipation (kcal/h)	560	280	560	280	560	280
Refrigerant	R404A/ MIXTURE	R404A	R404A / MIXTURE	R404A	R404A / MIXTURE	R404A
Noise level (dB(A))	52	52	52	52	52	52
Overall weight with packaging (kg)	220	200	250	230	280	260

Model	POLAR 340 V	POLAR 340 SV	POLAR 530 V	POLAR 530 SV	POLAR 550 H	POLAR 550 SH
External dimensions (LxDxH) (mm)	750x920x2000	750x920x2000	1000x920x2000	1000x920x2000	2320x910x1020	2320x910x1020
Internal dimensions (LxDxH) (mm)	450x530x1350	450x530x1350	700x530x1350	700x530x1350	1590x520x670	1590x520x670
Useful volume (l)	322	322	500	500	550	550
Temperature range (°C)	-40 -85	-20 -45	-40 -85	-20 -45	-40 -85	-20 -45
Temperature variations inside the space (1) (°C)	±3	±2	±3	±2	±3	±2
Temperature fluctuations over time (1) (°C)	±2	±1	±2	±1	±2	±1
Supply voltage	230 V (+ 6 / - 10%) / 50 / 1 + G					
Rated output (kW)	0,66	0,33	0,8	0,33	0,66	0,33
Absorbed current (A)	3	1,5	4,8	1,5	3	1,5
Thermal dissipation (kcal/h)	560	280	650	280	560	280
Refrigerant	R404A / MIXTURE	R404A	R404A / MIXTURE	R404A	R404A / MIXTURE	R404A
Noise level (dB(A))	52	52	55	55	55	55
Overall weight with packaging (kg)	260	240	290	270	390	370

(1) The values shown refer to tests carried out at a temperature of -40°C for the SH - SV models and of -80°C for the H - V models.

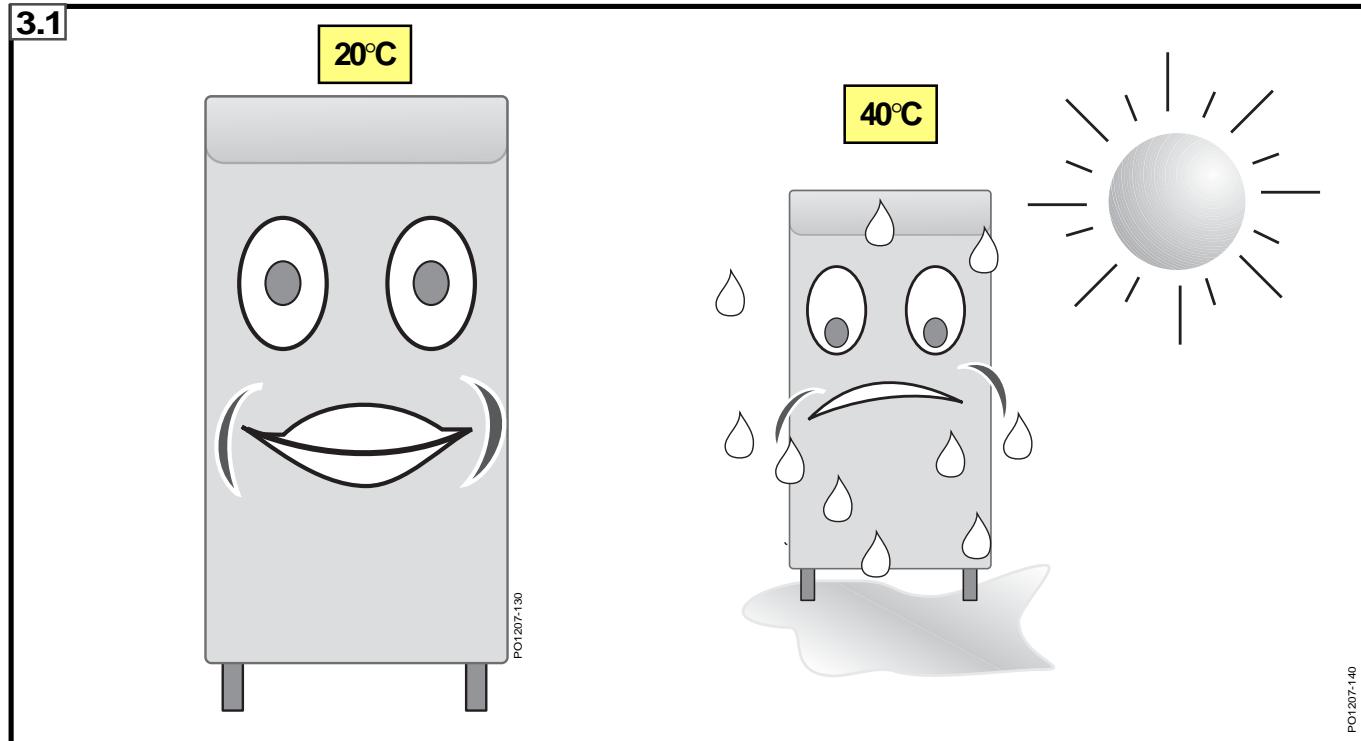
### 3.2 FUSES

Model	Symbol	Value	Code
POLAR 110 SH	FU	6 A	TT
POLAR 180 SH	FU	6 A	TT
POLAR 370 SH	FU	6 A	TT
POLAR 340 SV	FU	6 A	TT
POLAR 530 SV	FU	6 A	TT
POLAR 550 SH	FU	6 A	TT
POLAR 110 H	FU	10 A	TT
POLAR 180 H	FU	10 A	TT
POLAR 370 H	FU	10 A	TT
POLAR 340 V	FU	10 A	TT
POLAR 530 V	FU	10 A	TT
POLAR 550 H	FU	10 A	TT

### 3.3 ENVIRONMENTAL CONDITIONS

In order for the appliance to operate correctly, it should be placed in a site with the following requisites:

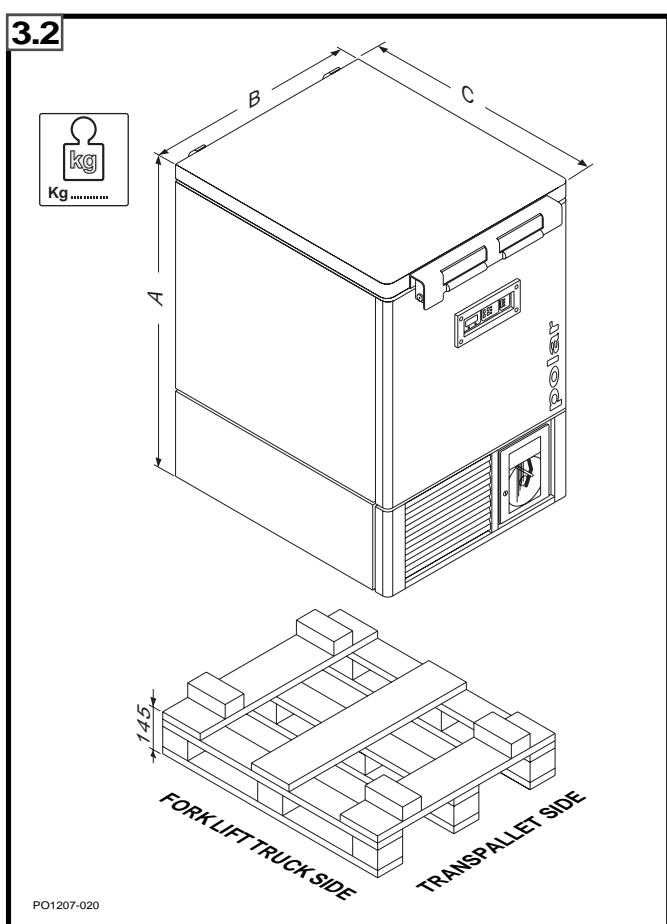
- far from heat sources,
- far from direct sunlight,
- far from air conditioning systems,
- in a dust-free ambient.



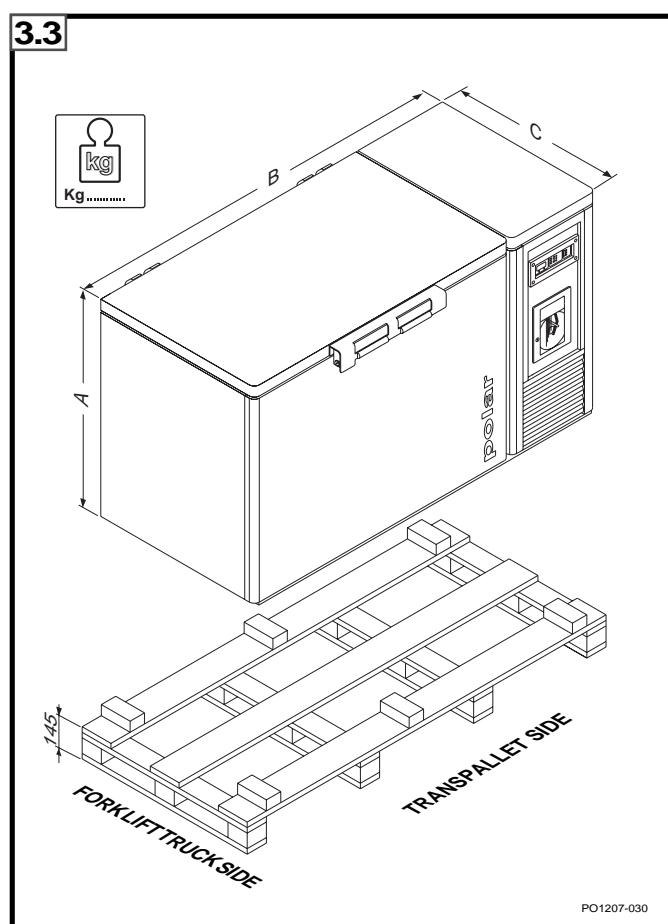
Ambient temperature	min: +10°C
	max + 30°C
Relative humidity UR	max 80%

### 3.4 TECHNICAL LAY-OUT DIAGRAMS

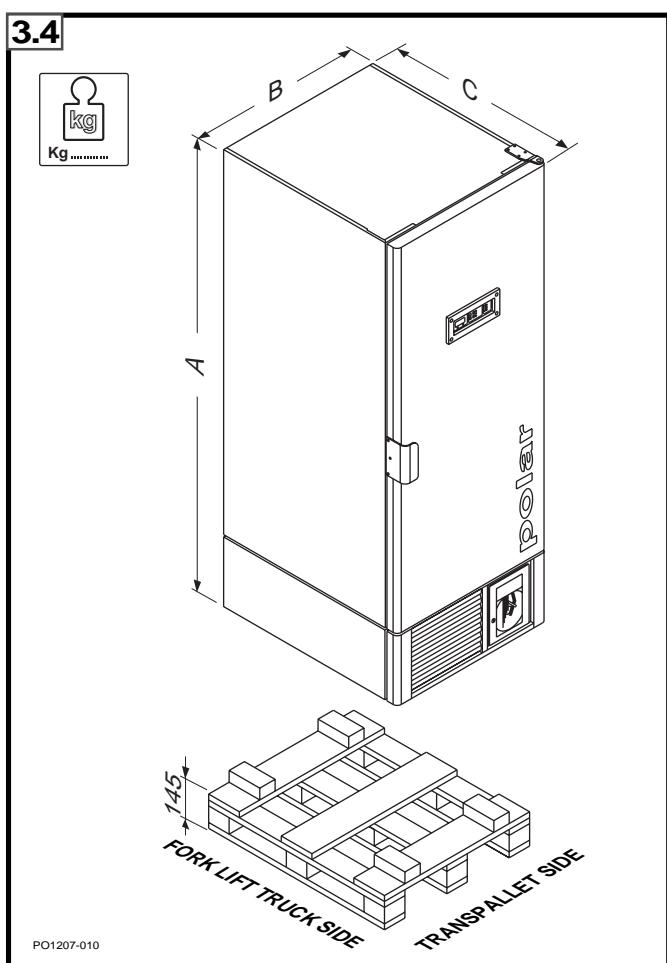
**3.2**



**3.3**



**3.4**



MODEL	A	B	C
Polar 110 H Polar 110 SH	1080	730	850
Polar 180 H Polar 180 SH	1145	980	1145
Polar 370 H Polar 370 SH	980	1780	800
Polar 340 V Polar 340 SV	2000	730	850
Polar 530 V Polar 530 SV	1985	980	850
Polar 550 H Polar 550 SH	1145	950	2315

## 4 HANDLING AND REMOVAL OF PACKAGING

### 4.1 PERSONNEL REQUISITES

Personnel in charge of handling the machine need no special requisites (just remember the type of packaging).

However, we suggest that this is done by someone who is accustomed to using machines for lifting and transport operations.

### 4.2 MACHINE CONDITIONS

The machine is normally supplied packed and on a pallet. If the machine is delivered by our staff, it may be without packaging. Other types of packaging may be supplied according to the destination and/or customer's needs.

### 4.3 EQUIPMENT NEEDED FOR HANDLING

The machine can be raised and moved by a lift truck, bridge crane, crane or other suitable means with an adequate capacity.

4.1

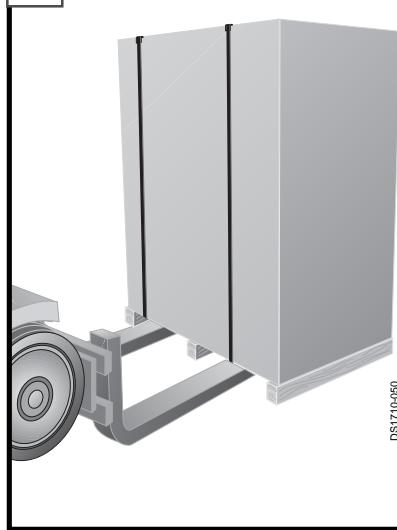


DS1710-010



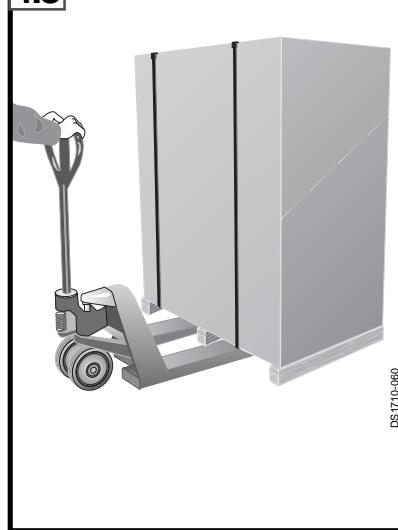
**Check that the forks are level and the load is stable before moving the machine.**

4.2



DS1710-050

4.3



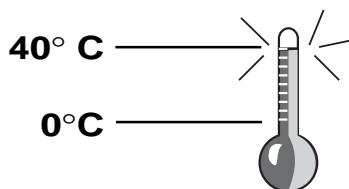
DS1710-060

#### Warning:

- Do not turn the machine upside-down
- Do not drag the machine
- Do not shake the machine

#### How to store the machine

It should be kept in a dry environment with an ambient temperature ranging from 0° ÷ 40° C.



Do not place packaged machines one on top of the other and always keep them in an upright position as indicated by the special arrows marked on the packaging itself.



**Make sure that the forks do not hit the machine frame.**

**If it is hit accidentally, check immediately for any damage and if necessary, contact the manufacturer.**

### HOW TO USE A LIFT TRUCK TO RAISE AND TRANSPORT PALLETIZED MACHINE

Take care to position the lift truck forks correctly so as not to damage the machine. The person in charge of handling will be responsible for avoiding damage to the external structure during this operation.

### HOW TO RAISE AND MOVE WITH A BRIDGE CRANE

Accessories: textile fibre belts and PVC angle bars.

Weight: see technical specifications



**Do not use place the machine in a sling of metal cables or chains as these could damage it.**

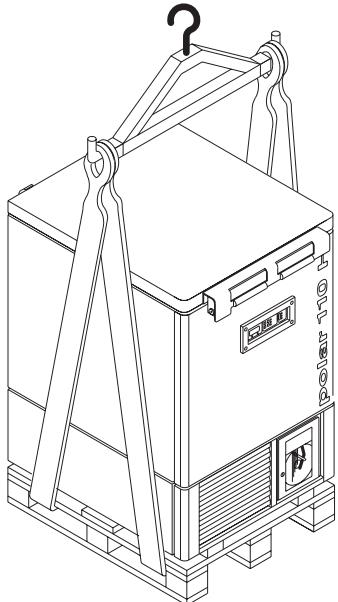
**Never put a sling around a machine without its pallet.**

**In order to prevent the oil in the compressor from flowing into the refrigerating circuit, only transport, stock and handle the equipment in an upright position according to the instructions on the packaging. If the machine is placed on its side, leave it in an upright position for at least 24 hours before switching on.**

## Diagram of slings

### Without packaging

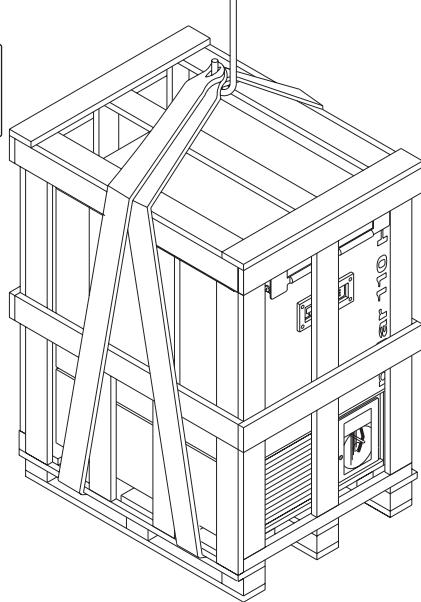
4.4



PO1207-050

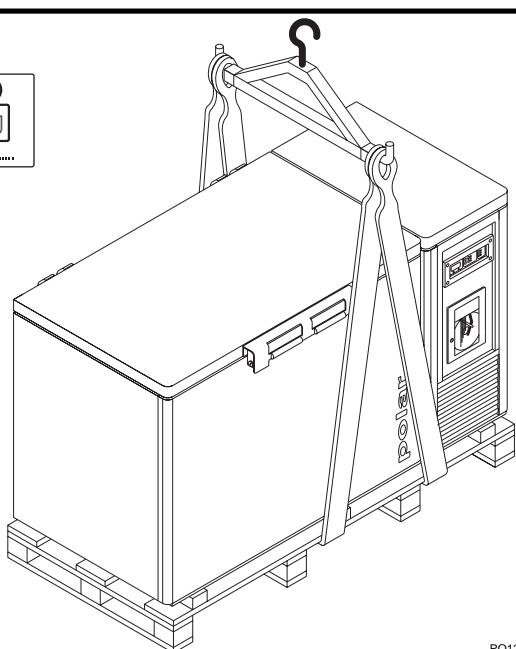
### With packaging

4.5



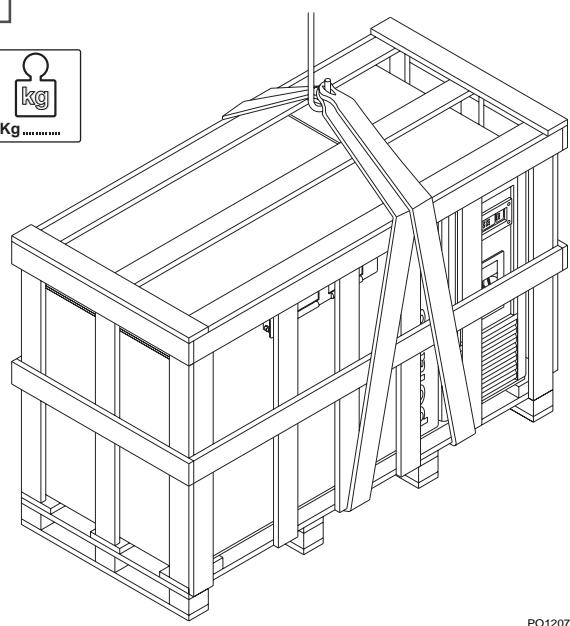
PO1207-090

4.6



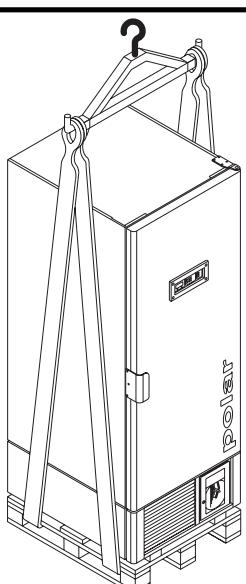
PO1207-060

4.7



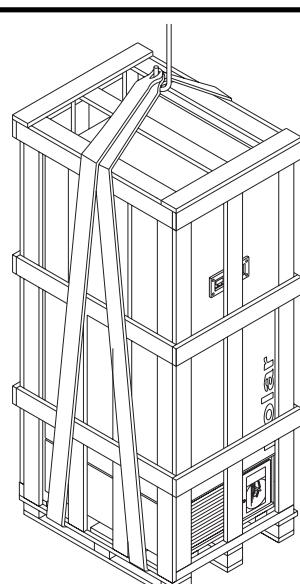
PO1207-100

4.8



PO1207-070

4.9



PO1207-110

## MANUAL HANDLING

The machine is equipped with four wheels so that it can be moved manually.

If the floor of the installation site is flat, no special precautions are required.

Take all the necessary precautions, however, before moving the machine:

- Bear in mind the mass which has to be moved and calculate the number of people needed to control the mass during movement.
- check that the floor is smooth and completely flat.

## 4.4 REMOVAL OF PACKAGING

The machine is delivered ready-to-go.

Before removing the machine from its packaging, check that it has not been damaged during transport.

If so:

- a) Contact your area representative
- b) Make a written report and if possible attach photographs showing the damage
- c) Send a copy of the report to:

Shipping agent insurance company

Shipping agent

Manufacturer or area representative



All the packaging materials can be recycled and can be disposed of according to the regulations in force. Take care to eliminate the packaging so that it does not become a danger and throw away the plastic bags, as they could cause children to suffocate.

### 4.4.1 How to remove the outer straps

4.10

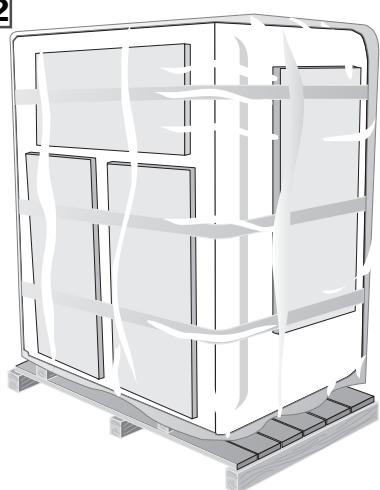


DS1710-010

DS1710-040

### 4.4.3 Removal of plastic materials

4.12



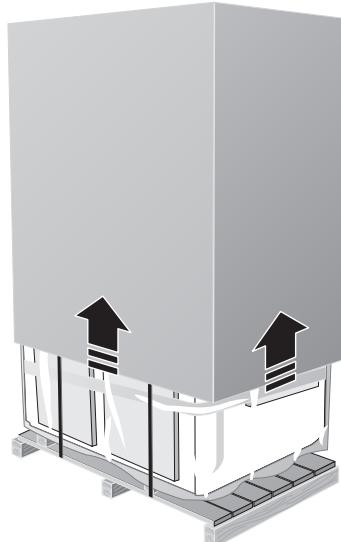
DS1710-090



When removing the plastic materials, make sure that you don't scratch the surface of the appliance.

### 4.4.2 How to remove the cardboard casing

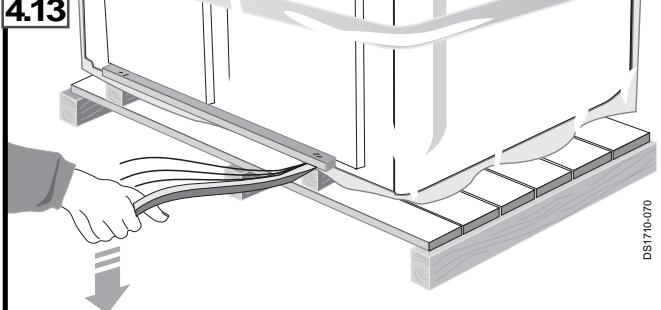
4.11



DS1710-030

### 4.4.4 How to remove the wooden side blocks

4.13



DS1710-070

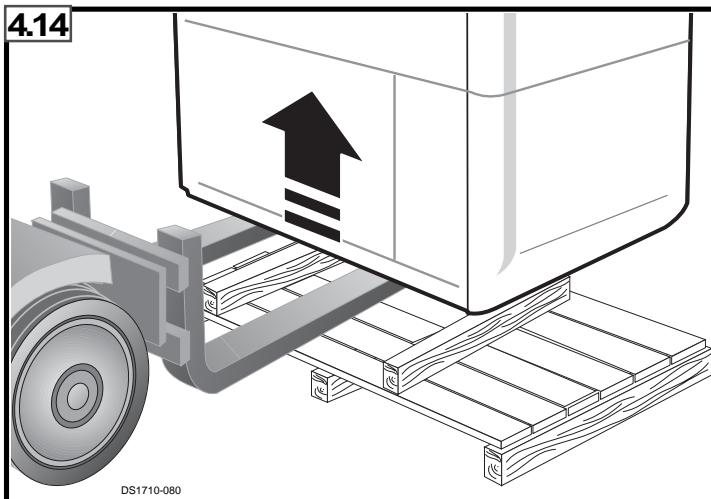
- Remove the screws that block the ledges on the cabinet.
- Use a special lever to remove the two wooden blocks.



Take care not to scratch the surface of the machine.

#### 4.4.5 How to remove the pallet

4.14



- Just raise the machine a few centimetres so that the pallet can be pulled out from underneath.
- The machine can be placed directly on the floor.



**Do not bang or scratch the machine.**



**In case of accidental bumps, please check if there is any damage and, should it be necessary, contact the manufacturer.**

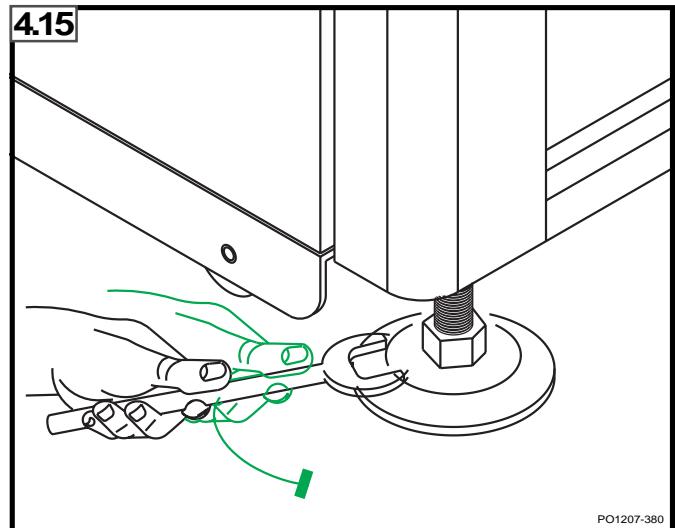
#### 4.5 HOW TO BLOCK THE MACHINE

The machine does not have moving parts which can jeopardize stability, therefore no devices are supplied to block the machine to the floor.

The machine has been designed to operate on a horizontal floor.

Level the machine to avoid undesired movements by means of the adjustable feet.

4.15



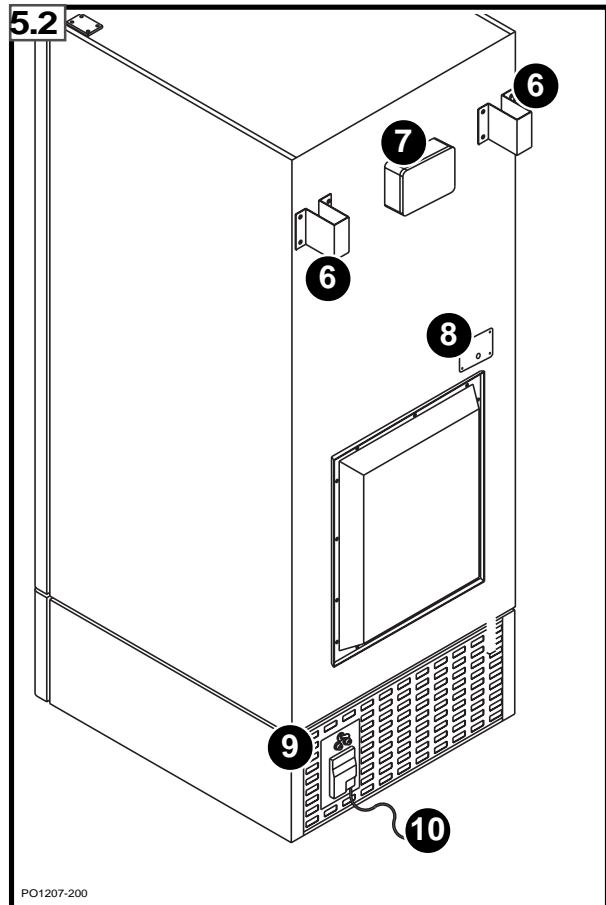
## 5 DESCRIPTION OF THE SYSTEM

### 5.1 GENERAL VIEW

5.1



5.2



- 1 Access door/lid
- 2 Chart recorder (optional)
- 3 Control panel
- 4 Air condenser grid
- 5 Handle to open door
- 6 Spacers
- 7 CO<sub>2</sub> connection
- 8 Remote control connection
- 9 Supply cable connection box
- 10 Supply cable

The structure is completely metallic made of galvanised sheet steel painted with epoxy resins.

The outer door or lid 1 has the same features as the main body, inside it is insulated with thermoformed, high pressure, shock-proof polystyrene and has a magnetic, water-proof gasket.

Spacers 6 are placed at the rear to enable the freezer to be kept 4 or 5 cm away from the wall.

## 5.2 INTERNAL VIEW

The inner storage compartment **12** is made of AISI 304 stainless steel.

The appliance is equipped with inner doors or lids **11** used to increase the thermal insulation grade.

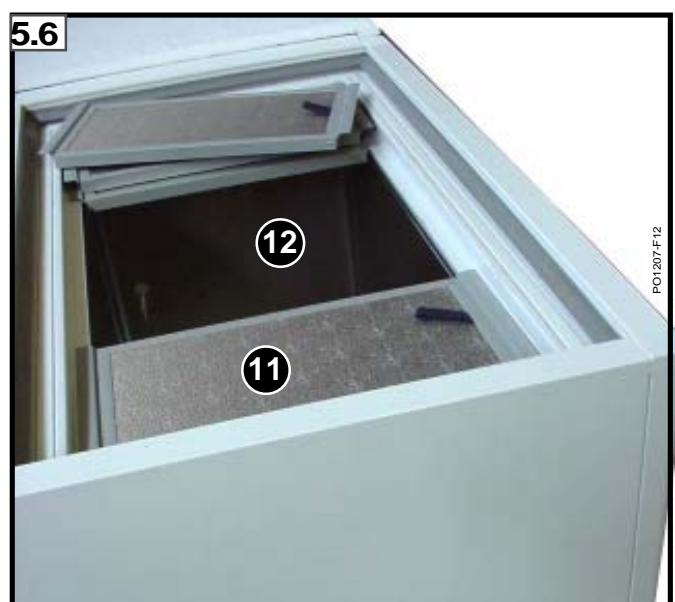
Upright models



The structure is equipped inside with shelves that can be adjusted in height according to the customer's needs.

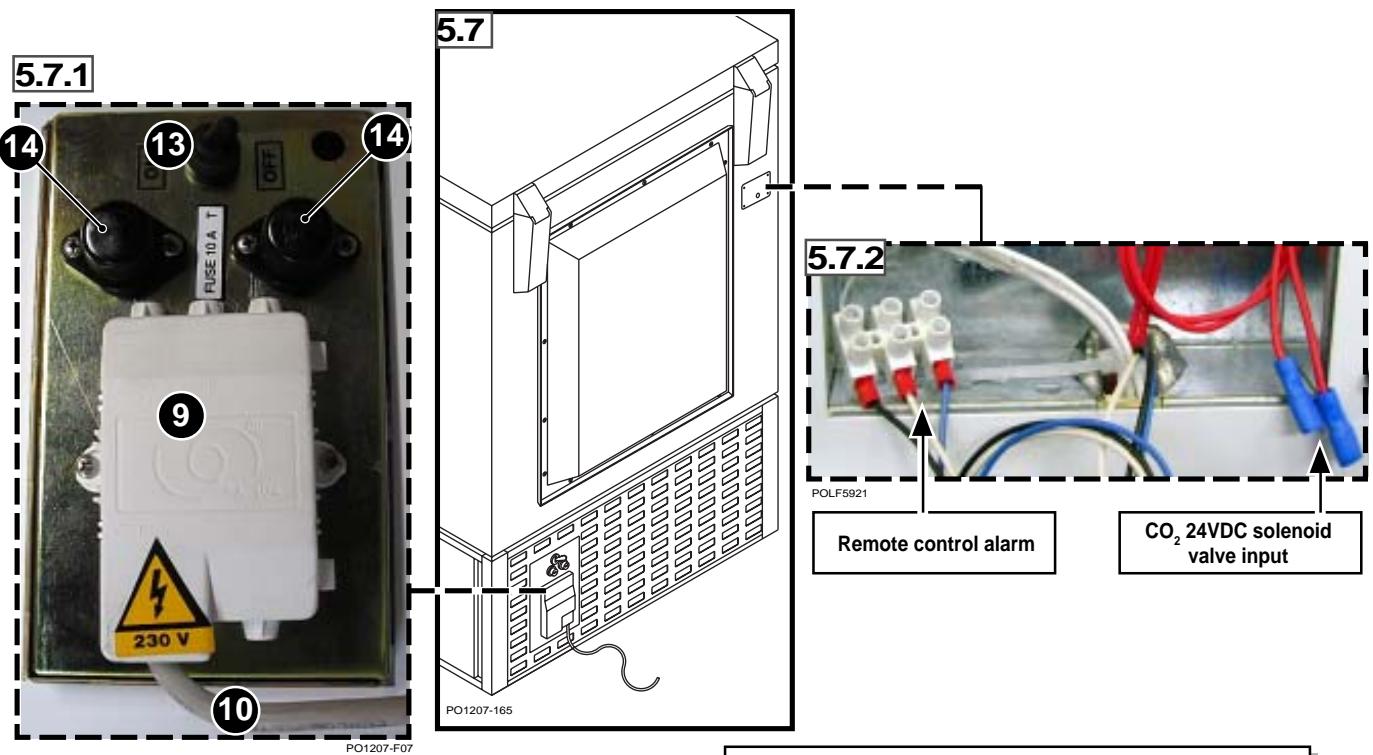
- 11** Inner lids
- 12** Inner storage compartments
- P** Adjustable shelves

Horizontal models

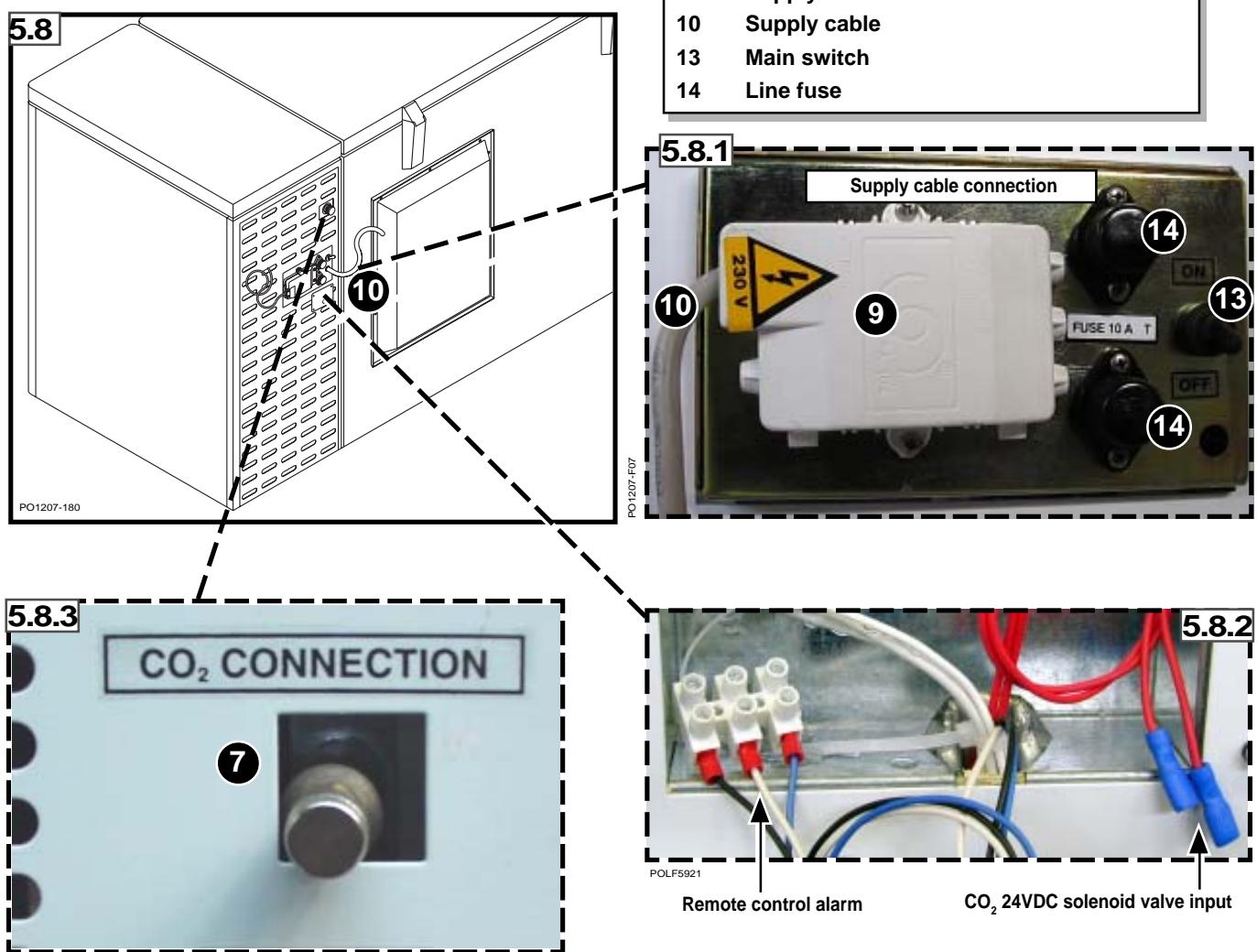


### 5.3 DESCRIPTION OF EXTERNAL CONNECTIONS

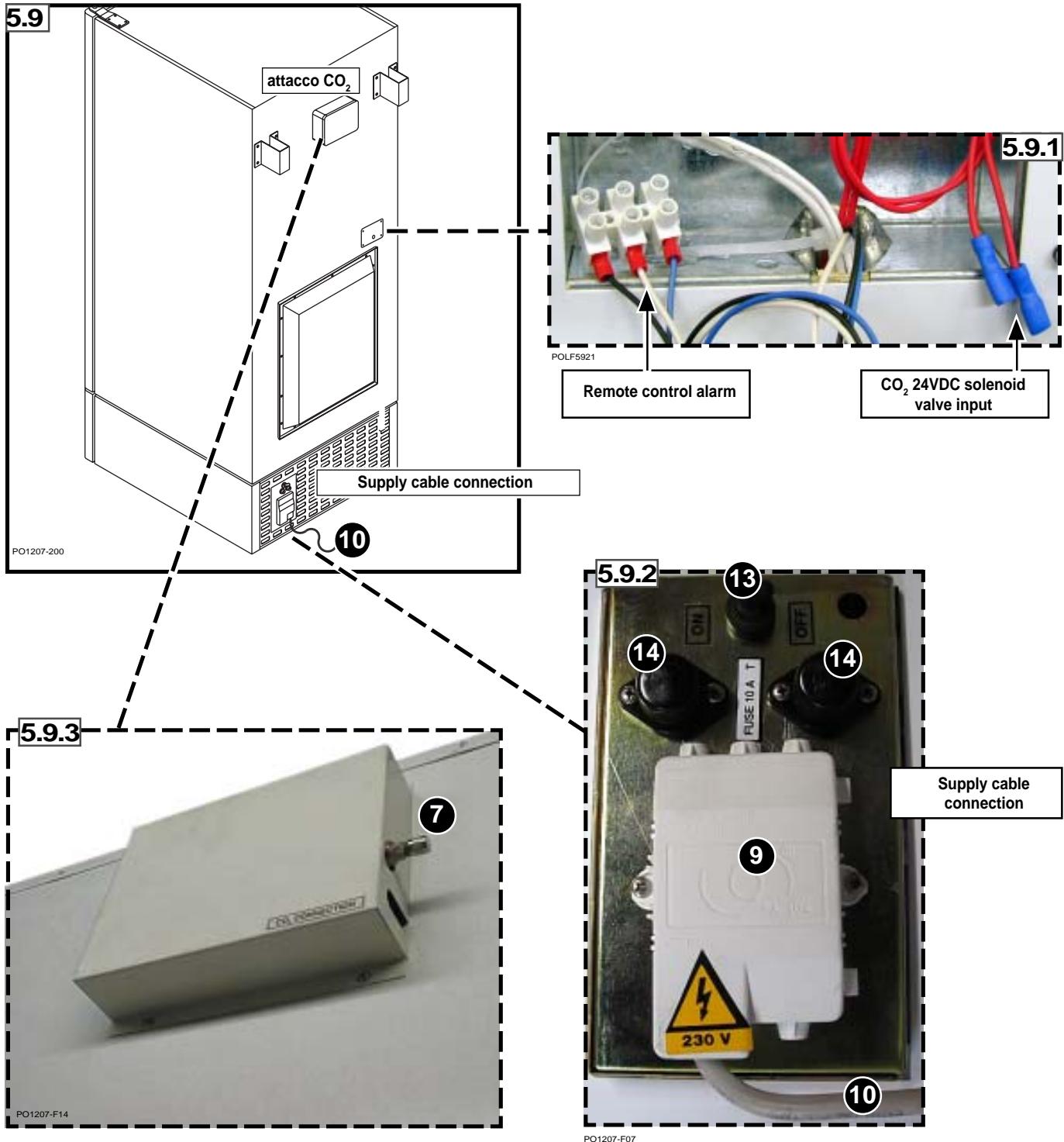
#### POLAR 110 - 180



#### POLAR 370 - 550



**POLAR 340 - POLAR 530**



7	CO <sub>2</sub> connection
9	Supply cable connection box
10	Supply cable
13	Main switch
14	Line fuse

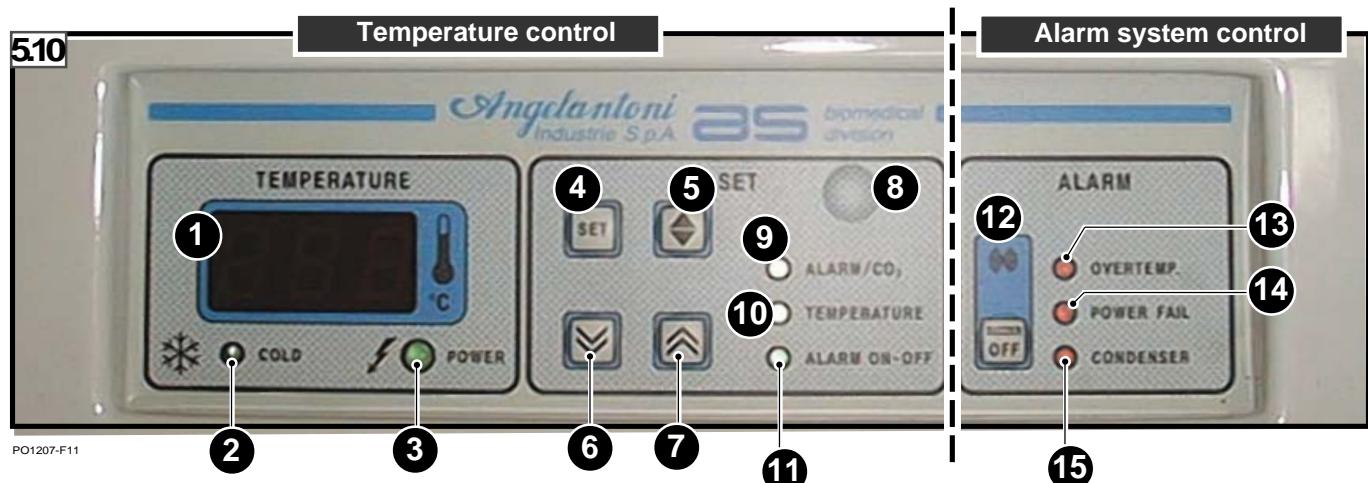
## 5.4 CONTROL SYSTEM

The microprocessor control panel is divided into two sections: the first to control and adjust the temperature, the second to run the alarm system, the auxiliary CO<sub>2</sub> cooling system and temperature visualization.

The electronic control runs the - 40°C or - 85°C freezer cooling unit.

This card has:

- 3 exits on relays to pilot the following devices:
  - 1<sup>st</sup> stage compressor (connected in parallel with the condenser fan engine)
  - 2<sup>nd</sup> stage (only in -85 °C freezers), remote control alarm system.
- 3 analog inputs for PT100 are:
  - also available refrigerating compartment temperature control
  - intermediate exchanger temperature control (only in -85 °C freezers)
  - refrigerating compartment temperature detection by the alarm / auxiliary CO<sub>2</sub> cooling and display system.
- Another input is used for the connection of an automatic-rechargeable buffer battery which supplies the necessary voltage to the system in case of power failure.
- An output drives the electromagnetic valve for CO<sub>2</sub> (liquid carbon dioxide) inflow into the auxiliary cooling system.



### 5.5.1 CONTROL PANEL - description of the keys

- 1 Display
- 2 Cooling ON/OFF indicator (green).
- 3 Power supply indicator (green).
- 4 Button used to set the operating, control and alarm temperature.
- 5 Button used to change the setting and to read the temperature value of the control probe.
- 6 Button used to decrease temperature or to disable the alarm/CO<sub>2</sub> system when pressed together with the hidden button.
- 7 Button used to increase temperature.
- 8 Hidden button.
- 9 This led (when ON) indicates that the alarm and CO<sub>2</sub> temperature is being modified (yellow).
- 10 This led (when ON) indicates that the operating temperature setting is being modified (yellow).
- 11 This led (when ON) indicates that the alarm system is enabled (green).
- 12 Acoustic alarm OFF button.
- 13 Flashing warning light - temperature-rise alarm (red).
- 14 Flashing warning light - lack of supply alarm (red).
- 15 Flashing warning light - obstructed condenser alarm (red).

## 5.5 COOLING SYSTEM

### -40°C Freezers: POLAR 110 SH, 180 SH, 370 SH, 340 SV, 530 SV, 550 SH

The cooling system is completely sealed and uses a particularly silent, hermetic compressor in order to reach the low evaporation temperatures (-40°C).

The condenser is ventilated by means of an electrically-driven helicoidal fan. The evaporator consists of copper pipes in direct contact with the inner refrigerating compartment. Thus allowing the freezer to be free from hindrances and store products of various forms and dimensions onto shelves whose height can be easily modified to fulfil all possible storage requirements.

### -85°C Freezers: POLAR 110 H, 180 H, 370 H, 340 V, 530 V, 550 H

The cooling system is completely sealed and uses two particularly silent compressors.

To obtain low evaporation temperatures (-90°C) a cascade cooling system is used; it consists of two separate systems using two different refrigerants.

The condenser is ventilated by means of an electrically-driven helicoidal fan.

The evaporator consists of copper pipes in direct contact with the inner refrigerating compartment.

Thus allowing the freezer to be free from hindrances and store products of various forms and dimensions onto shelves whose height can be easily modified to fulfil all possible storage requirements.

## 5.6 FUNCTIONING OF THE COOLING SYSTEM

Refrigeration is obtained by the evaporation of the refrigerating fluid which is sucked up by the compressor in gaseous form. The compressor is used to compress the gas (refrigerating gas) inside the condenser; thanks to the effect of high pressure and refrigeration the gas turns into a liquid substance.

This fluid is then pushed through a capillary pipe (bottleneck) inside an evaporator where it evaporates (expansion) under the effects of low pressure (cooling). The cycle ends when the gas is sucked up again by the compressor.

**The system needs no gas refilling for particular servicing; it would be advisable, however, to have the system serviced every 6 months by specialised personnel.**

## 5.7 FUNCTIONING OF THE AUXILIARY CO<sub>2</sub> COOLING SYSTEM

The auxiliary CO<sub>2</sub> cooling system is used to cool the internal refrigerating compartment down by spraying liquid CO<sub>2</sub> through a capillary pipe; the expansion of this gas/refrigerant allows the freezer to reach very low temperatures (down to -73°C).

If the freezer is supplied with the above system, whenever the internal temperature accidentally exceeds the alarm limit, an electrically-driven valve opens the circuit allowing the passage of CO<sub>2</sub> into the freezer.

Liquid CO<sub>2</sub> (carbon dioxide) being a throwaway material is used only when no other solution can be found to keep the stored products safely.

The system controlling the freezer temperature operates the alarm; the auxiliary CO<sub>2</sub> cooling system is supplied by an automatic-rechargeable buffer battery allowing 12 hours of functioning in the absence of power supply.

## 5.8 INSULATION

Average thickness: 140 mm. Obtained by injection of polyurethane foam (40 kg/m<sup>3</sup>).

## 6 INSTALLATION

### 6.1 POSITIONING OF THE MACHINE

In order to bring the machine to the installation site, refer to chapter 4.

During installation remember to leave enough space for work and maintenance operations.

Check that the floor is perfectly flat.

Check the ambient conditions of the installation site (see paragr. "3.3 ENVIRONMENTAL CONDITIONS").



**WARNING!** The machine has not been designed to operate in areas classed as dangerous (explosive), provided for in the CEI (EIC) norm 64/4. The machine cannot operate in an explosive or corrosive ambient. The equipment being classified as IP 20 is not fit for operation outdoors or in places that are not protected against atmospheric agents.

Should the user need to place the equipment in places other than those described above, always contact the manufacturer (Angelantoni Industrie SpA) before starting operation.

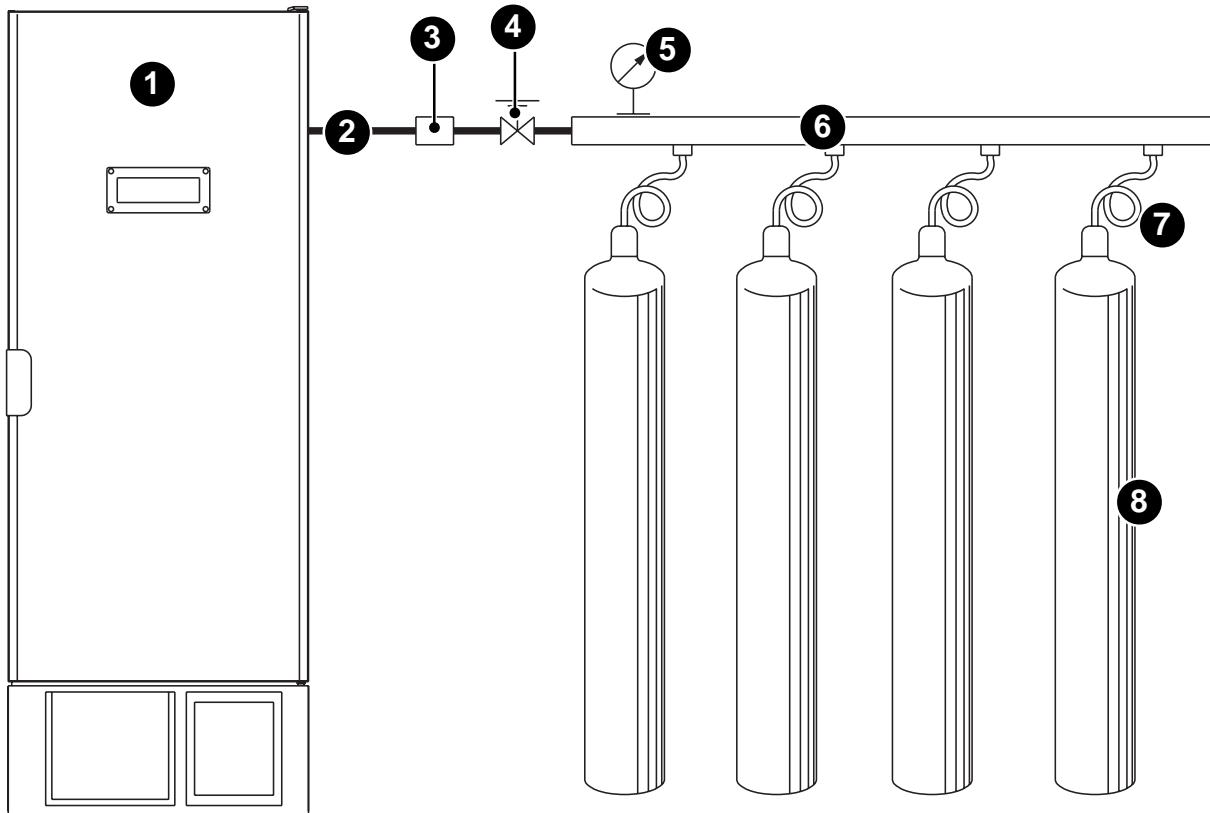
### 6.2 HOW TO CONNECT THE CO<sub>2</sub> CYLINDERS



#### **WARNING! IMPORTANT NOTE!**

If the freezer is equipped with the auxiliary CO<sub>2</sub> cooling system, the installation site must be well aerated in order to avoid an excessive accumulation of carbon dioxide, which should be dangerous if inhaled in big quantities.

6.1



1 Freezer

2 Connection hose pipe (supplied)

3 Mechanical filter (not supplied) (\*)

4 Manual check valve (not supplied) (\*)

5 Gauge (not supplied) just indicates whether there is CO<sub>2</sub> in the cylinders (\*)

6 Header for cylinder connection (not supplied) (\*)

7 Cylinder/header connection hose pipe (not supplied) (\*)

8 Liquid CO<sub>2</sub> cylinders bottles complete with plummet (not supplied) (\*)

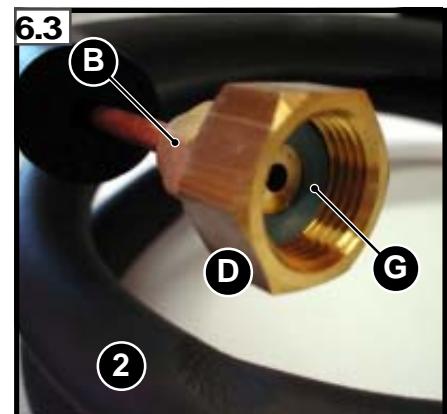
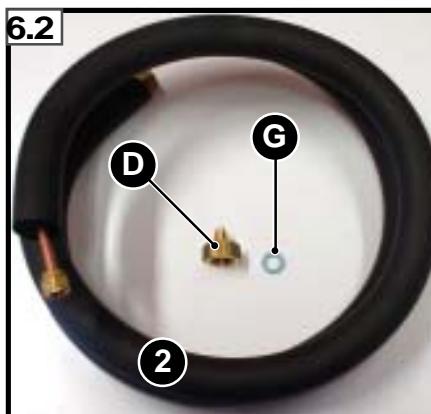
- Set up the cylinder connection as shown in the diagram (showing all the component parts for correct installation). Use liquid CO<sub>2</sub> cylinders with a ball cock valve with plummets.

The average consumption of a freezer whose alarm limit is set at -40°C or -70°C is 4 kg/hour approximately; therefore, if you wish to have a 24-hour operating autonomy, please provide the necessary quantity of bottles totally accounting for 100 Kg of refrigerating fluid. An automatic-rechargeable buffer battery ensures 12-hour functioning in the absence of power supply.

\* for customer's use

In order to assemble the cylinder connection tube **2**:

- insert gasket **G** into adapter nut **D**;
- screw the adapter nut **D** on to the cylinder;
- put pipe neck **C** into position and screw the pipe union **B** to the adapter nut **D**.



#### 6.2.1 HOW TO REPLACE THE CYLINDER

When the cylinder runs out of CO<sub>2</sub> and has to be replaced, check that the pipe neck **C** of the connection tube **2** is not damaged in any way (cf. "UNDAMAGED Pipe Neck") (fig. 6.2).

If the pipe neck appears damaged e.g. it shows cracks (cf. "DAMAGED Pipe Neck"), excessive wear of the copper layer etc., replace the connection tube **2**.

The connection tube should, in any case, be replaced after the CO<sub>2</sub> cylinder has been replaced three times.

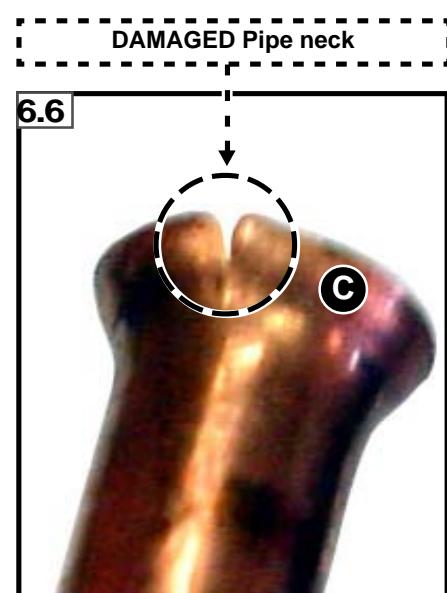
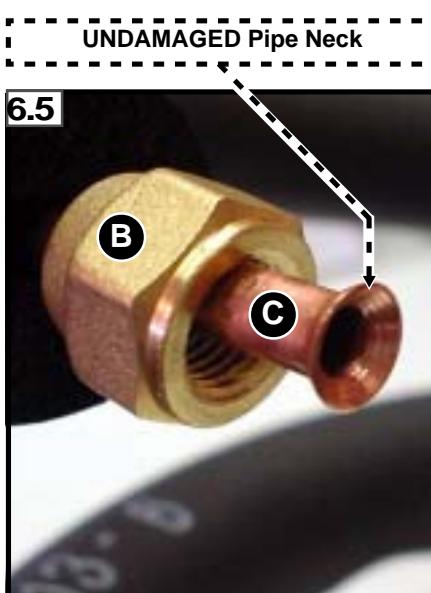
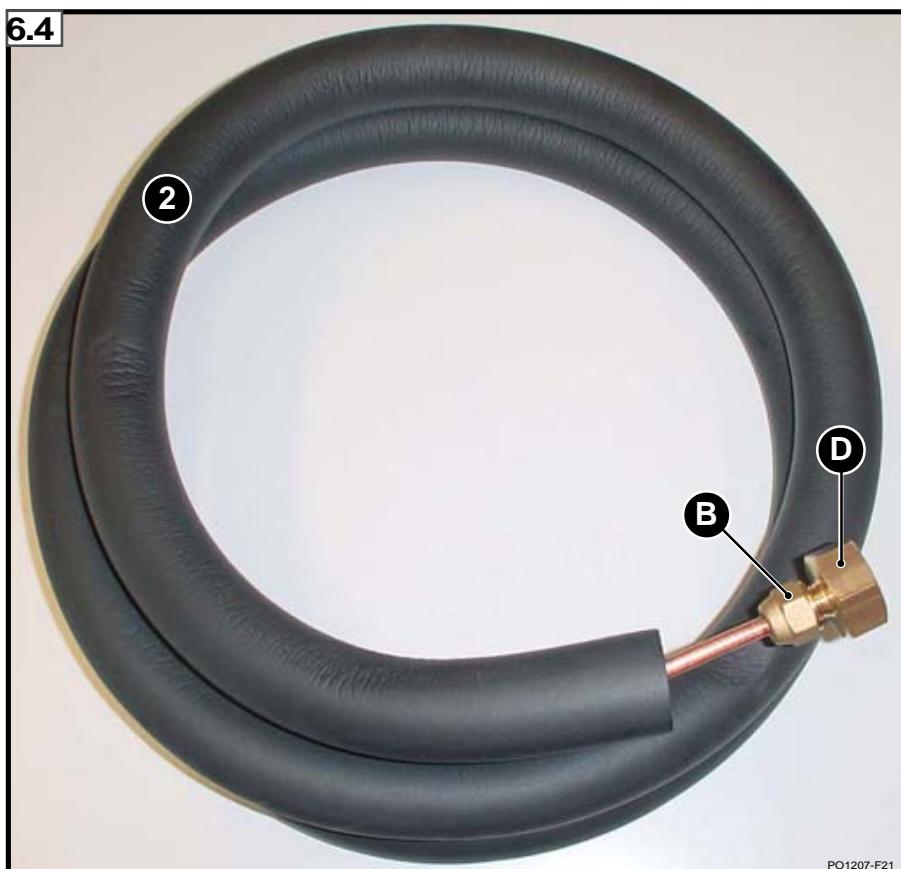
The connection tube can withstand a pressure of 100 bars.

In order to replace the cylinder connection tube **2**:

- unscrew the pipe union **B**;
- unscrew the adapter nut **D**.

To order the connection tube **2**, ask for CO<sub>2</sub> CONNECTION TUBE FOR POLAR".

Specify the model and registration number of your equipment (ref. Chapter 1).



### 6.3 ELECTRICAL WIRING

The appliance should be run on a mains supply with the value indicated on the rating plate (see chapter 1 "Summary of rating plate data").



This equipment can be considered electrically safe only when it has been correctly wired and an efficient earth system has been installed as foreseen by the safety norms in force. This fundamental point of safety must be checked and if you are in any doubt, ask for the system to be accurately checked by professional qualified personnel. To ensure a correct installation of the equipment in compliance with the safety standards in force, it will be necessary to provide a special omnipolar switch-operated socket whose contact pitch is equal to or higher than 3 mm, complete with fuses and differential switch placed so as to allow easy access.

Certain fundamental rules must be followed when using this machine as when using any electrical machine, such as:

- do not touch the equipment with wet or damp hands or feet.
- do not place the machine on normally wet floors.
- do not use extensions in bathrooms or showers.
- do not pull on the supply cable in order to disconnect it from the mains supply.

Class 1 insulation, complete with supply cable, without differential switch protection degree  $\leq 0.5$  mA. "THE EQUIPMENT COULD BE A SOURCE OF ELECTRIC DISCHARGE IN THE EVENT OF BREAKDOWN OR INTERRUPTION OF THE PROTECTION CONDUCTOR. THEREFORE, TO IMPROVE SAFETY CONDITIONS, IT COULD BE ALSO INSTALLED (ACCORDING TO THE USER'S REQUIREMENTS) PERMANENTLY" (ref. 6.12.2.1 of CEI/EN 61010-1 adjustments).

#### 6.3.1 How to connect to the electrical mains supply

The machine is supplied with a cable already connected to the panel terminal board; just insert the plug into the mains socket.

#### 6.3.2 Replacement of the supply cable

The supply cable **10** complete with 16A plug in compliance with the adjustments in force (CEI-EN 61010-1 ref. 6.12.2.2) is connected to a special, visible container **9** whose active parts are protected against accidental contacts.

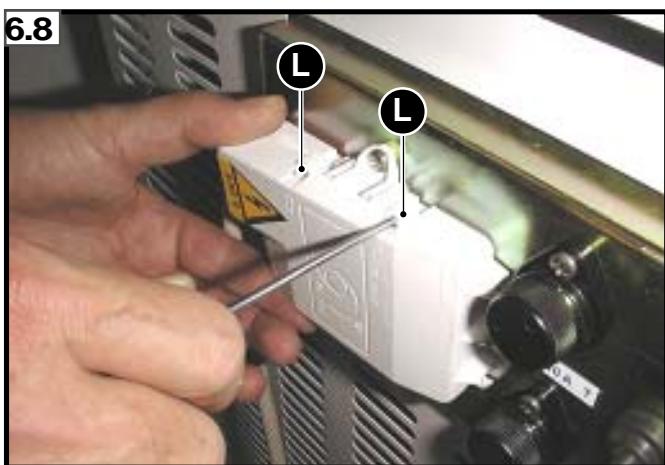
In order to replace the supply cable proceed as follows:

- use a screwdriver to press gently on levers **L** in order to open the electrical connection box (fig. 6.8);
- remove screws **V1**, **V2**, **V3** (fig. 6.9) connecting the supply cable wires;
- change the supply cable and use the screws **V** to reconnect the wires;
- close the electrical connection box again.

6.7

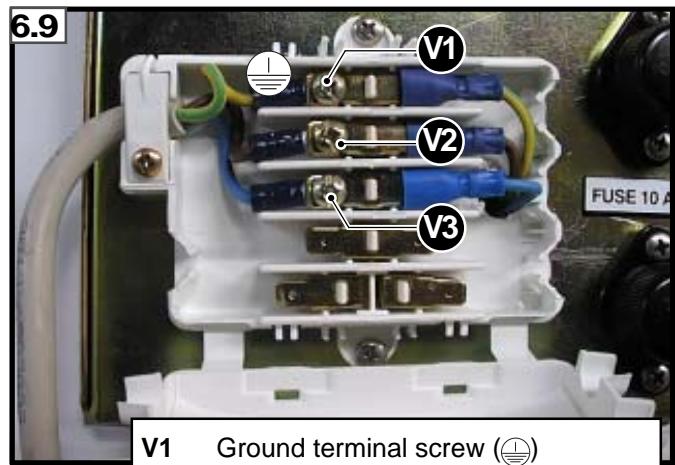


6.8



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6.9



**V1** Ground terminal screw ( $\ominus$ )

**V2** Phase conductor terminal screw (L)

**V3** Neutral conductor terminal screw (N)

#### WARNING:

It is strongly recommended to unroll the supply cable for all its length and check that it is not crushed.

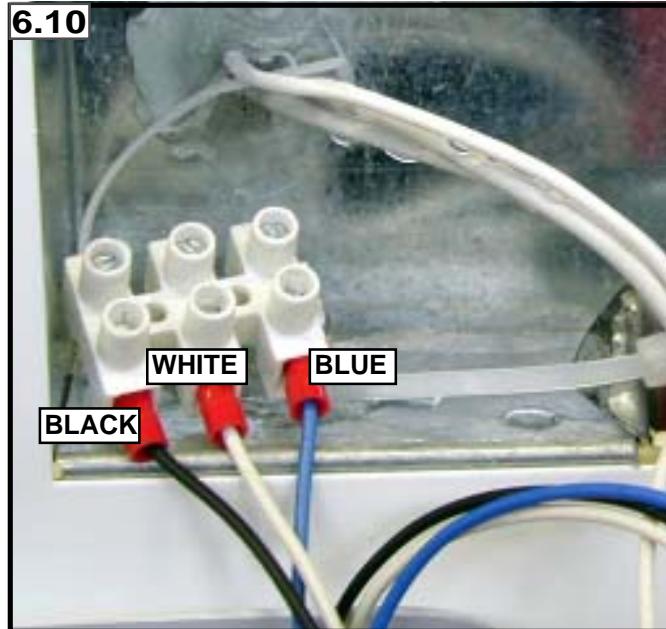


### 6.3.3 Remote alarm

The attachment for the remote alarm is a clean switch contact.

The contact can tolerate a maximum electricity of 2A at 230 V.

- cable color BLUE = common
- cable color WHITE= NO
- cable color BLACK= NC



### 6.4 WATER CONDENSER CONNECTION

**Warning! This description does not concern machines with an air condenser.**

The connections for water condenser are located in the rear part of the equipment.

- Connect the pipes to the connections referring to the label

This chamber is built only for the choosed type of water when purchasing.

The minimum water flow rate must be 0,4m<sup>3</sup>/h.



6.11

POW F5256

WELL/TOWN WATER					
Pressure bar (1bar: Pa x 10 <sup>5</sup> )		Temperature °C		Connections diameter	
min	max	min	max	inlet/outlet	
3	6	10	18	3/8"G	

**Regularly check the hydraulic connections and pay special attention to the hose pipes.**

The connection pipes between the water plug and the chamber must be hose pipes in order to allow partial movement of the chamber itself during maintenance.

Installation is advisable for regular checks of: thermometer, pressure gauge with pressure reducer and manual ON/OFF valves.

## 7 USE FORESEEN BY THE MANUFACTURER

### 7.1 AIM OF THE MACHINES

The ultra low-temperature monolithic freezers herein described have been developed for the storage of pharmaceuticals, plasma, serum, biological material and vaccines in research laboratories.

They can also be employed for the storage of those industrial products that need to be kept at temperatures in the -20°C / -40°C range in to the single stage freezers (POLAR 110 SH, 180 SH, 370 SH, 340 SV, 530 SV, 550 SH) or -20°C / -85°C range in to the double stage freezers (POLAR 110 H, 180 H, 370 H, 340 V, 530 V, 550 H).

For further information, please refer to chapter 3 entitled "Technical specifications".

### 7.2 INTENDED USE OF THE MACHINES

The machines have been designed for research laboratories and must be used only for the articles mentioned in paragraph 7.1

Before treating different materials from those indicated in paragraph 7.1, please contact the manufacturer to obtain a specific authorization.

### 7.3 OPERATOR

No special technical knowledge is needed to use this machine.



Special attention must be paid to the temperatures which can be reached inside the test chamber. The values in the temperature field for all the equipment referred to in this handbook are shown in the tables in chapter 3 "Technical specifications".

Before opening the door or lid to handle the specimens, always wear gloves that can withstand low temperatures.

### 7.4 USE LIMITS

The machines may be used within the range of ambient conditions as described in chapter 3 entitled "TECHNICAL SPECIFICATIONS".

This series of machines must not contain:

- inflammable and/or explosive liquid or solid materials.
- liquid or solid materials which could generate inflammable gases during evaporation or sublimation.
- liquid or solid materials containing chemically aggressive substances.
- liquid or solid materials could generate aggressive fumes during evaporation or sublimation.



### 7.5 USE OF PROTECTIVE CLOTHING



Suitable protective clothing must be worn, as stated in the norms in force, for protection against the temperatures both inside the machine compartment and of the test specimens themselves.

### 7.6 DANGEROUS AREAS AND WASTE RISKS

When the equipment is switched on, personnel must not touch internal parts; risks from low temperatures are present. Take all the necessary precautions and wear suitable protective clothing.

## 8 START-UP

- Check that the mains supply voltage is the same as the one marked on the rating plate.

### 8.1 DESCRIPTION OF THE CONTROL PANEL



#### 1 DISPLAY

This usually indicates the temperature inside the freezer but it also shows the temperature read by the control probe, the control and alarm/ CO<sub>2</sub> set-points. The display also shows the various alarm messages listed hereinafter:

E3 Message associated to a "POWER FAIL" alarm (lack of supply voltage).  
E1 Message associated to a probe breakdown condition.

#### 2 "COLD" led

Led warning light associated with a cooling request.  
It lights up (green light) when a lower temperature is required.

#### 3 "POWER" led

Led warning light connected with power supply or failure. It lights up when the power supply is switched on (main switch pointing to ON).

#### 4 SET

Allows the display and modification of the set points of temperature and alarm/CO<sub>2</sub>.

#### 5 CHANGE

Allows the modification of the control temperature setting or the display of the control system probe temperature.

#### 6 DOWN

- Decreases set values key
- Enables or disables the alarm/CO<sub>2</sub> system if used with key 8 (hidden).

#### 7 UP

Key to increase the temperature and the set values.

#### 8 HIDDEN BUTTON

Allows control temperature values or the alarm/CO<sub>2</sub> temperature to be modified.

#### 9 "ALARM/CO<sub>2</sub>" led

This led (when ON) indicates that the alarm and CO<sub>2</sub> temperature is being modified (yellow).  
It lights up when the alarm/CO<sub>2</sub> temperature is being set.

#### 10 "TEMPERATURE" led

This led (when ON) indicates that the operating temperature setting is being modified (yellow).  
It lights up when the control temperature is being set.

#### 11 "ALARM ON-OFF" led

This led (when ON) indicates that the alarm system is enabled (green).  
Led associated to the alarm/CO<sub>2</sub> system.  
It lights up when the alarm/CO<sub>2</sub> system is enabled.

#### 12 BUZZER OFF

acoustic alarm signal OFF button.  
Allows the alarm acoustic signal to be disabled.

#### 13 "OVERTEMP." led

Blinking indicator - overtemperature alarm (red).  
It lights up on when the equipment exceeds the alarm limit.

#### 14 "POWER FAIL" led

Blinking indicator - lack of supply alarm (red).  
It lights up in case of a power failure.

#### 15 "CONDENSER" led

Blinking indicator - obstructed condenser alarm (red).

## 8.2 START UP

- Open the tower or well water supply at connection (only for machines equipped with water condenser).
- It is advisable to install upstream the condenser an anti-calcareous filter.

### 8.2



PO1207-F07

- Insert the plug into the special feed socket (see paragraph entitled "Electrical Wiring")
- Use key **13** (ON/OFF) to switch on the machine.

## 8.3 REGULATION OF THE OPERATING TEMPERATURE

### 8.3



In order to set the operative temperature:

- hold down keys **8** (HIDDEN) and **5** (CHANGE)
- press and release key **4** (SET)  
The display **1** will show the previously set temperature value and the led **10** (TEMPERATURE) will light up.  
The system is now set to vary the operating temperature
- Change the values with keys **6** (DOWN) and **7** (UP) decreasing and increasing.

The new value is shown on the display **1**; after 5 seconds, the value is saved automatically. Release the HIDDEN BUTTON (**8**) and the CHANGE BUTTON (**5**) to display the real temperature.

**In order to check that the operation to set the temperature has been carried out correctly, repeat the procedure described above (1 and 2). The temperature that can be set on the control panel must be within the -20°C / -40°C range into the single stage freezers (POLAR 110 SH, 370 SH, 340 SV, 530 SV) or -40°C / -85°C range into the double stage freezers (POLAR 110 H, 370 H, 340 V, 530 V).**

When this operation has been completed, the freezer will reach the set temperature value.

## 8.4 CO<sub>2</sub> ALARM SYSTEM ON/OFF

8.4



PO1207-F11

The alarm system is switched on or off by pressing key 8 and key 6 (DOWN) simultaneously. When the alarm system is enabled, the led 11 is on.

## 8.5 REGULATION OF THE ALARM/CO<sub>2</sub> SYSTEM TEMPERATURE LIMIT

- To set the alarm/CO<sub>2</sub> temperature limit, keep the HIDDEN BUTTON (8) pressed.
- Then press and release the SET BUTTON (4). The display 1 will show the previously set temperature value and the ALARM/CO<sub>2</sub> led (9) will turn on. The system is now set to vary the alarm/CO<sub>2</sub> temperature.
- Modify the temperature value by pressing the DOWN (6) and UP (7) buttons. The new value is shown on the display 1; after 5 seconds, the value is saved automatically. Release the HIDDEN BUTTON (8) and the CHANGE BUTTON to display the real temperature.

In order to check that the operation to set the temperature has been carried out correctly, repeat the procedure described above.

The temperature that can be set on the alarm/CO<sub>2</sub> system control panel must be within the -10°C / -35°C range into the single stage freezers (POLAR 110 SH, 370 SH, 340 SV, 530 SV) or -30°C / -75°C range into the double stage freezers (POLAR 110 H, 370 H, 340 V, 530 V).



### WARNING:

If the temperature set as alarm limit is lower than the operating set temperature, the alarm/CO<sub>2</sub> condition will be always present

When starting the freezer up for the first time, it is advisable to disable the alarm system until the internal temperature reaches values lower than set alarm limits.

## 8.6 OTHER FUNCTIONS OF CONTROL PANEL

### 8.6.1 Alarm signals

**Led 13 red)** When the led is on and blinking, it indicates that the temperature inside the freezer has exceeded the alarm limit. If the auxiliary CO<sub>2</sub> cooling system is connected, the electromagnetic valve will allow the refrigerant into the refrigerating compartment. Along with this signal the buzzer (acoustic signal) is also enabled and the relay for the remote alarm transmission closed.

**Led 14 red)** When the led is on and blinking, it indicates that the power supply is absent; it is enabled even if the fuses are burnt or if the supply cable is interrupted. Along with this signal, the buzzer (acoustic signal) is also enabled and the relay for the remote alarm transmission closed. The display starts blinking and shows the code message E3.

**Led 11 red)** When the led is on and blinking, it indicates that the condenser (ref.11.4) is obstructed by dust or some

other material and does not allow a correct thermal exchange with the environment; it is enabled even when ambient temperature exceeds +35°C. Along with this signal, neither buzzer (acoustic signal) nor relay for the remote alarm transmission are enabled.

To stop the buzzer during an alarm condition, press the BUZZER OFF button (ref. 12); the buzzer will automatically resume ringing when a new alarm condition is detected.

When an alarm condition is detected, the visual signal is sent first and the acoustic signal follows after 30 seconds; the relay for remote alarm transmission is closed simultaneously.

When the acoustic alarm is disabled through the BUZZER OFF button (ref. 12), the remote alarm is not functioning.

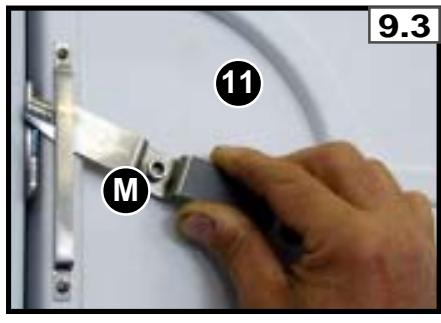
## 9 USE



PO1207-F30



PO1207-F31



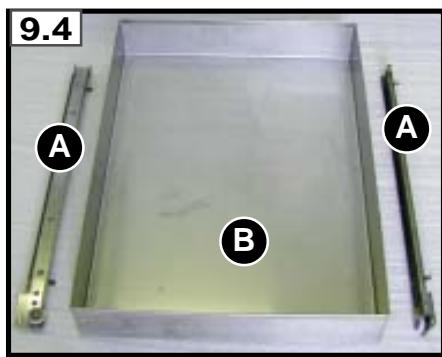
PO1207-F32

- Go inside the chamber (fig. 9.2 - 9.3).
- Turn the handle **M** downwards in order to open the protection doors **11**.

**IMPORTANT NOTE:** when the freezer is in operation, the protection doors **11** must be kept closed.

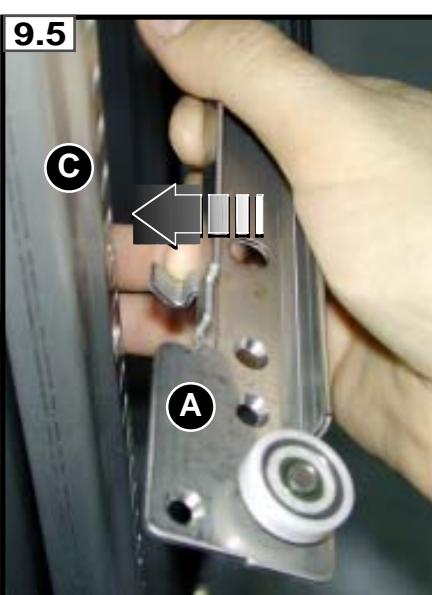
They must be closed as soon as possible after they have been opened (e.g. in order to remove material), in order to avoid excessive formation of ice and to ensure the freezer works correctly.

### 9.1 HOW TO INSTALL THE DRAWERS (only for vertical models)

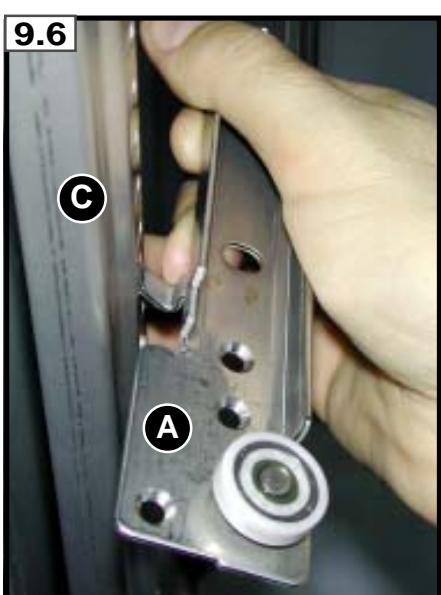


PO1207-F32

A	Guide-runs
B	Drawers
C	Racks

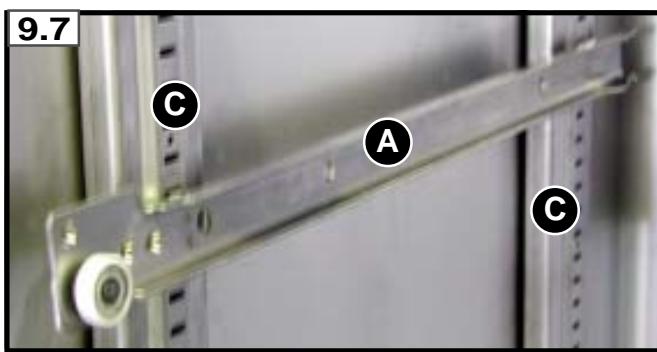


PO1207-F33

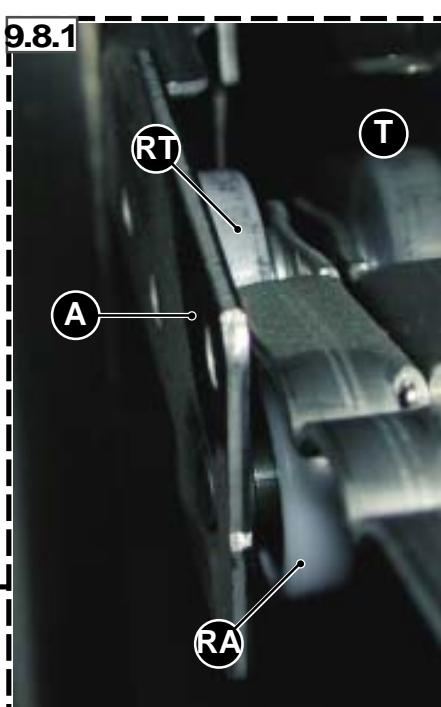


PO1207-F34

- Insert the guide-runs **A** into the racks **C** (front and rear, on the right-hand and left-hand side) as shown in figs. 9.5, 9.6, 9.7.



PO1207-F37



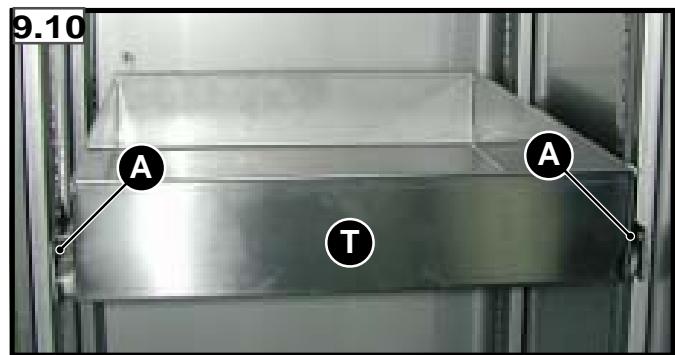
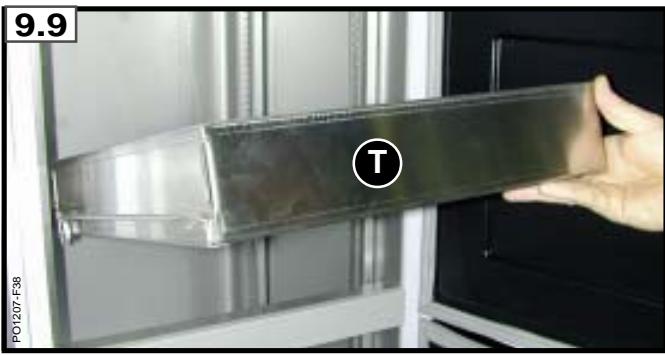
PO1207-F38

PO1207-F39

In order to insert drawer **T**, proceed as follows:

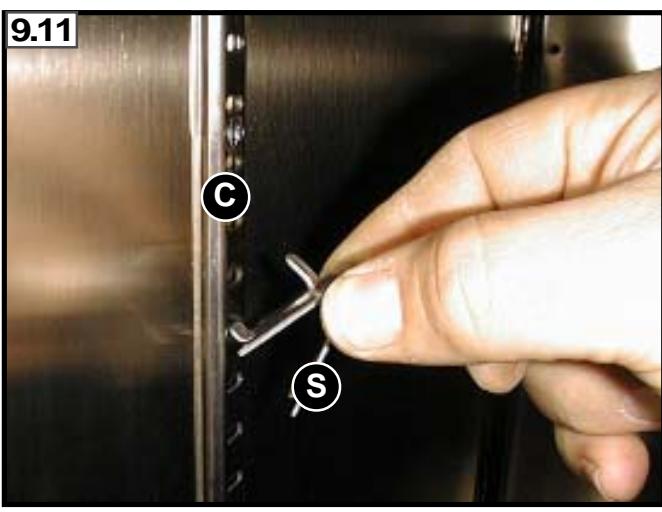
- insert the drawer wheels **RT** behind the guide-run wheels **RA**, as shown in figure 9.8.1.

This system prevents the drawers from sliding out of the guide-runs when they are opened.

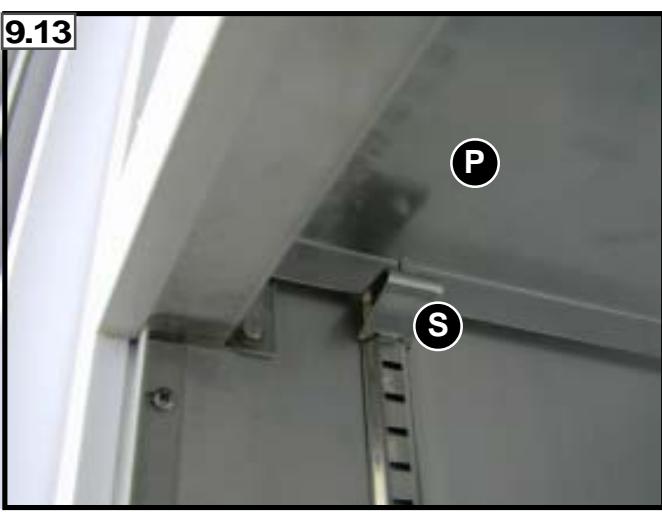


- Slide the drawers **T** along the guide-runs **A** and push them inside the chamber.

## 9.2 HOW TO INSTALL THE SHELVES (only for vertical models)



- Follow the operations shown in figs. 9.11 and 9.12 in order to mount supports **S** at the required height .



- Rest the shelves **P** on the supports **S** and check:
  - their stability;
  - that they are resting firmly on all four supports **S**.

## 9.3 PRODUCT LOADING

Make sure the shelves are well fastened (only in upright models) and do not place containers in direct contact with the bottom of the refrigerated compartment.

Insert a few objects at a time inside the refrigerating compartment after temperature has become stable.

Ambient temperature material (e.g. +25°C) should be put inside the freezer gradually and in small quantities to ensure proper storage; allow the equipment to freeze the products inside the refrigerating compartment before introducing new material to be frozen. If this important rule is not observed, the temperature inside the freezer could suddenly increase and cause previously stored products to deteriorate.

Whenever material is taken from or put inside the freezer, act very quickly since door opening determines a continuous change of air with subsequent temperature increase and ice formation on internal walls.



**Do not store products imbued with liquid substances inside the freezer since they could produce vapours during the first cooling phase, leading to ice formation on internal walls.**  
**WARNING!**

**Do not store liquid products in hermetically-sealed containers as freezing could cause the containers to break and the liquid to leak.**

## 9.4 TEMPERATURE CHART RECORDER

Freezers can be supplied with a temperature chart recorder **2** upon customer request.

The standard 7-day battery-operated recorder comes complete with a clock run by a 1.5V high-capacity accumulator lasting approximately 6 months. The temperature chart recorder is moreover supplied complete with no. 1 printing cartridge and no. 55 chart disks ensuring 1-year coverage. Contact Angelantoni's Assistance Service for additional printing cartridges and chart disks.

**9.14**



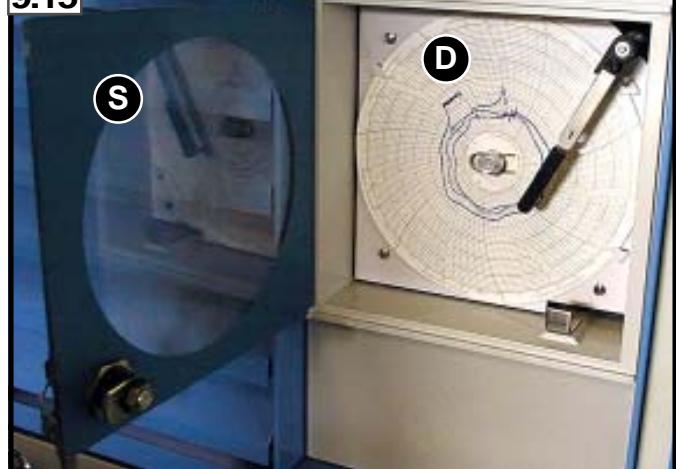
PO1207-F25

### 9.4.1 Use of the recorder

The recorder has a battery powered clock.

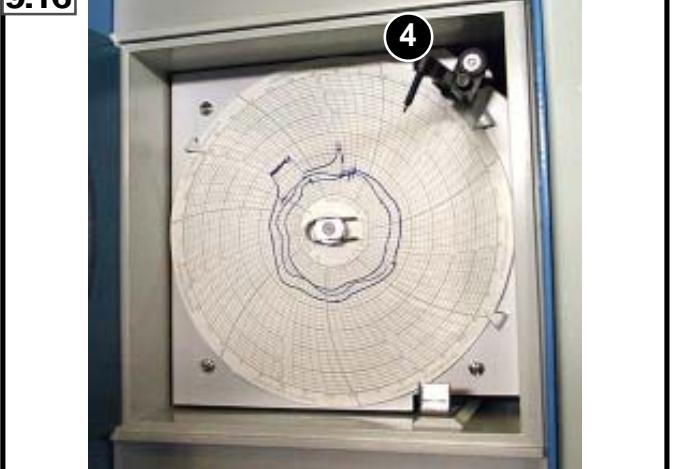
#### Chart disk replacement

**9.15**



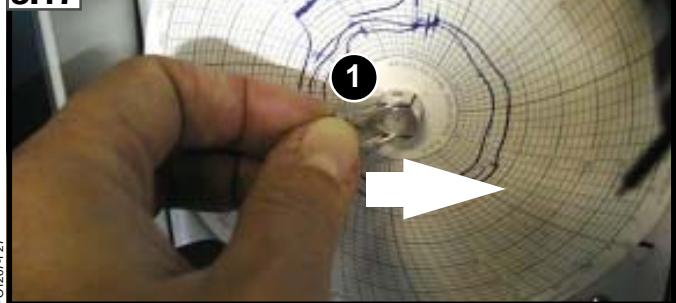
PO1207-F25

**9.16**



PO1207-F26

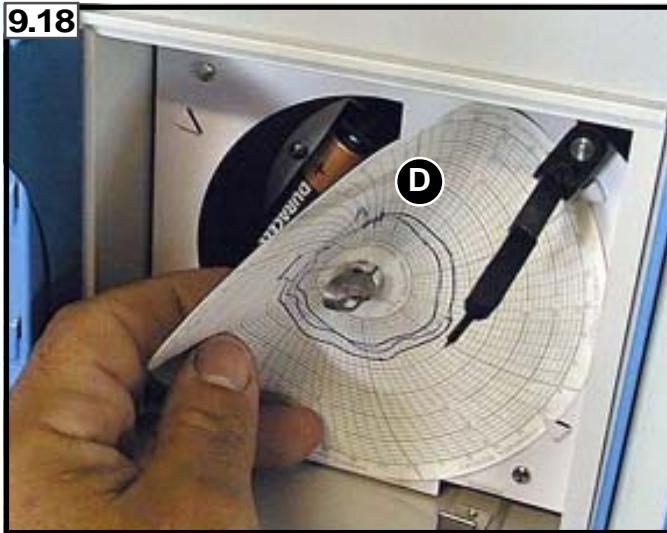
**9.17**



PO1207-F27

- Open the lid **S** of the recorder (fig. 9.15).
- Lift the pen **4**.
- Move the lock **1** in the direction shown by the arrow and lift it.

9.18



PO1207-F28

#### Battery substitution (every 4 months) (fig. 9.19).

- Follow the steps described in points 9.16 and 9.18, and move the diagram disk without removing it.
- Replace the battery when necessary with a new 1.5V (Mod. AA LR6) battery.

- Remove the chart disk **D** and install the new chart disk in the central pin.

- Move the lock **1** to the previous position and lower the pen **4**

9.19



PO1207-F29

#### WRITING

##### - Writing cartridges.

The instruments are supplied with pen points already inserted into their respective rods. In order to start up, proceed as follows:

- remove the protective, plastic caps from the cartridge writing tips.

##### - Writing cartridges replacement

If the writing should appear faulty, replace the pen points. Proceed as follows:

- Hold the rod firmly and remove the pen point that has to be replaced by pulling it downwards.
- Insert a new pen point of the same colour and the same length.

To order the nib, please specify the code as indicated in the following table.

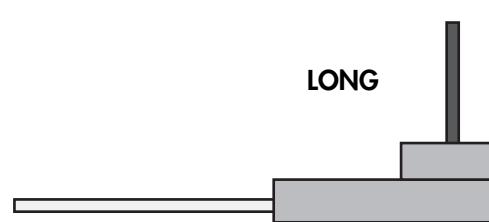
The code number to order the recorder disk is printed on the centre of the recorder disk itself.

9.20

#### FIRST PEN



#### SECOND PEN



PO1207-290

RECORDER TYPE	COLOURS	
	FIRST PEN	SECOND PEN
SINGLE PEN	MEDIUM BLUE code N° 133962	
TWO PENS	MEDIUM RED code N° 133969	LONG BLUE code N° 133968

## 10 SAFETY DEVICES - CHECK AND SET-UP



The safety devices systems concerning the cooling system cannot be checked or set by the user and are, therefore, described in chapters 11 and 12. There are no more safety devices in the present machines.

SAFETY DEVICES	CHECK	SET-UP
Key to lock handle.	This key ensures that the machine cannot be opened either accidentally or on purpose by unauthorized personnel. The temperature of the connector may be very low.	<ul style="list-style-type: none"><li>Close the door, remove the key and check that the door will not open.</li></ul>  10.1 <small>PO1207-F30</small>

## 11 MAINTENANCE



Maintenance must be carried out by qualified personnel. Some maintenance operations may be carried out when the machine is working and therefore all the necessary safety precautions should be taken. With the exception of specific cases maintenance operations must be carried out in the following conditions:

- machine switched off
- chamber temperature the same as ambient temperature
- machine disconnected from the mains supply
- supply valves or taps above the machine closed.

### 11.1 ALARM SYSTEM AND AUXILIARY CO<sub>2</sub> COOLING SYSTEM CONTROL

In order to check that the alarm system is working correctly and to make sure whether the buffer battery is charged, proceed as follows:

- disconnect the plug from the mains socket;
- in "alarm system control" section on the control panel (refer to paragraph 5.4) led 14 (POWER FAIL) lights up and after 30 seconds the acoustic alarm as well as the remote control alarm switches on; if not, the buffer battery is damaged. Call your technical assistance service or specialized service technician and ask for it to be replaced.

To check the correct functioning of the auxiliary CO<sub>2</sub> cooling system (if present) allow internal temperature to increase (e.g. by opening the door) and to exceed the SET alarm limit; when this limit is exceeded, CO<sub>2</sub> should flow inside the refrigerating compartment. On the contrary, call the Technical Assistance Service.

It is recommended to perform the above operations every 6 months and every time the internal refrigerating compartment is defrosted.

### 11.2 DEFROSTING AND CLEANING OF THE STRUCTURE

This operation should be performed every 6 months at least. This interval may however vary according to the number of times the door is opened in that period of time.

- Disconnect the plug from the mains socket
- Turn the general switch onto OFF (please refer to 10.1)
- Open the external door and the inner doors of the freezer. After 2 hours, the freezer should be completely defrosted. Collect the water at the bottom of the freezer.
- Remove the internal shelves (vertical model only)
- Clean the silicone gaskets with a cloth soaked in neutral detergent and then rinse with another cloth soaked in water.
- Introduce the shelves again inside the freezer(vertical model only)
- Start the freezer again and store products only after the set temperature has been reached.



**WARNING!** Never spray water directly on any part of the equipment since the electric insulation could be seriously damaged and cause malfunctioning. Never try to remove the ice with your hands. Danger of scratches and burns from very low temperatures.

### 11.3 CLEANING OF GASKETS

Dirt deposits on door and inner door gaskets may compromise their functionality.

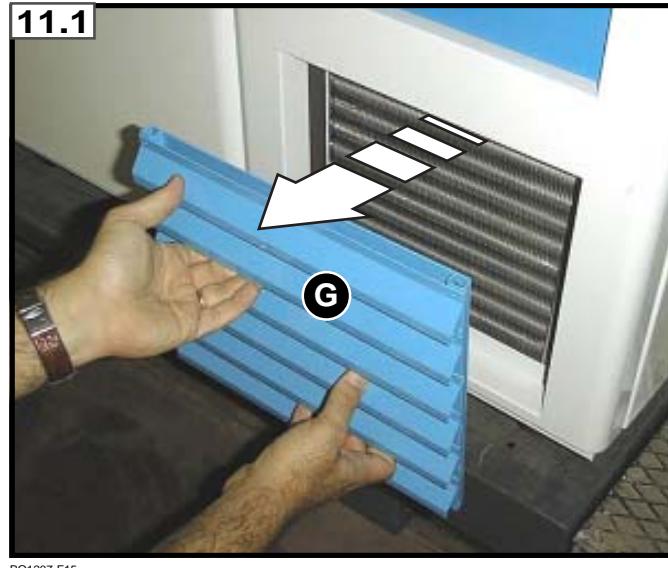
- Clean the silicone gaskets with a cloth soaked in neutral detergent and then rinse with another cloth soaked in water.

## 11.4 CLEANING OF THE CONDENSER

Clean the condenser every 6 months with soft brushes or blowing compressed air on it.

In order to carry out this operation proceed as follows:

- remove grid **G** as shown in the photo (it is fastened by permanent magnets. To remove, simply pull forwards).
- clean the condenser (lying just behind the grid);
- replace the grid.



PO1207-F15

### 11.4.1 Cleaning of the water condenser

MACHINE PART	HOW TO OPERATE	HOW OFTEN
<b>Water condenser (machines equipped with this device)</b>	<ul style="list-style-type: none"><li>• Remove the cylinder heads and remove any deposit (the operation must be carried out by qualified personnel only).</li></ul>	<ul style="list-style-type: none"><li>• Every six months or as soon as the cooling system shows signs of diminished performance.</li></ul>

## 11.5 SERVICING OF THE COOLING SYSTEM

Each freezer is equipped with a cooling system consisting of hermetically-sealed compressors. Therefore, if no accidental leakage occurs, neither the refrigerant nor the unfreezeable oil must be added.

It is however recommended to have the equipment checked by skilled personnel once a year.

## 11.6 SERVICING OF THE ELECTRIC-ELECTRONIC SECTION

The command and control electronics is a simple, extremely reliable integrated system housed inside a container. No special servicing is required.

It is however recommended to have the equipment checked by skilled personnel once a year to verify the alarm system functioning, the linearity of the displayed temperature and to replace (every 5 years) the compressor command relay.

Our company provides its own economic, subscriber "SPECIALIZED TECHNICAL ASSISTANCE SERVICE".

## 12 TROUBLESHOOTING



The maintenance operations that ANGELANTONI INDUSTRIE SpA authorizes are those indicated in the chapter entitled "Regular maintenance". The information given in the column "SOLUTION" in the tables below does not authorize any operations if these compromise safety; the information is given to help any specialized technicians find the fault.

PROBLEM	PROBABLE REASON	SOLUTION
The machine does not start	<ul style="list-style-type: none"> <li>• There is no supply from the mains.</li> <li>• The main switch is in "OFF" position</li> <li>• The plug is not connected to the main</li> <li>• Some other reason not mentioned above</li> </ul>	<ul style="list-style-type: none"> <li>• Check and proceed accordingly</li> <li>• Turn ON the main switch</li> <li>• Connect the plug to the main</li> <li>• Call your technical assistance service.</li> </ul>
The equipment does not reach the set temperature	<ul style="list-style-type: none"> <li>• Setpoint programming error.</li> <li>• There is too much material in the test chamber.</li> <li>• The test compartment contain too much and/or too wet material.</li> <li>• Malfunctioning of the regulation system.</li> <li>• Malfunctioning of the cooling system.</li> </ul>	<ul style="list-style-type: none"> <li>• Check the set temperature value following the procedure as in (rif. 8.3).</li> <li>• Reduce the quantity.</li> <li>• Allow temperature values to stabilise.</li> <li>• Call the technical assistance service.</li> <li>• Call the technical assistance service.</li> </ul>
The equipment does not reach the set temperature (machine equipped with water condenser)	<ul style="list-style-type: none"> <li>• <b>The cooling system is not working correctly</b> Continual request for "cold", the compressor stops every now and again</li> </ul>	<ul style="list-style-type: none"> <li>• If the equipment has a water condenser, check that the system has a sufficient water supply; if the system has a sufficient supply and the difference in temperature between the inlet pipe and the outlet pipe is very low or is nonexistent, this indicates that the condenser is blocked and has to be cleaned or replaced (the temperature difference can be measured by simply touching the pipes with your hand). If the above solution does not resolve the problem, contact your technical assistance service.</li> </ul>
The equipment is too noisy	<ul style="list-style-type: none"> <li>• The equipment is not evenly laid on the floor.</li> <li>• Contact with foreign bodies.</li> <li>• Damaged mechanical parts.</li> </ul>	<ul style="list-style-type: none"> <li>• Remove the cause.</li> <li>• Check that foreign bodies such as boxes or other structures do not come into contact with the equipment so as to avoid vibrations during functioning.</li> <li>• Check that moving mechanical parts such as fans are not sources of noise.</li> </ul>
The display shows alarm codes	<ul style="list-style-type: none"> <li>• Refer to paragraph (ref. 8.1) of these operating instructions.</li> </ul>	<ul style="list-style-type: none"> <li>• Call the technical assistance service and specify the type of code displayed as well as the possible cause.</li> </ul>

## 13 REMOVAL FROM INSTALLATION SITE

The machine can be disassembled in order to move it from one site to another or in order to be scrapped.

Transport must be carried out in compliance with the norms described in this handbook in the chapters "HANDLING" and "INSTALLATION".

### 13.1 DISASSEMBLY

- In order to disconnect the machine from the mains supply, follow the procedure described for the electrical wiring in reverse.
- Clean the surfaces accurately, oil the parts that could rust and cover the machine so as to protect it from dust, dirt and humidity.

### 13.2 SCRAPPING

- In order to disconnect the machine from the mains supply, follow the procedure described for the electrical wiring in reverse.
- Discharge all the refrigerant from the refrigerating circuit.
- Remove all the oil from the motors.



**WARNING! This product should not be left in the surrounding environment:**

- refrigerating substances;
- the compressor oil;
- polyurethane.

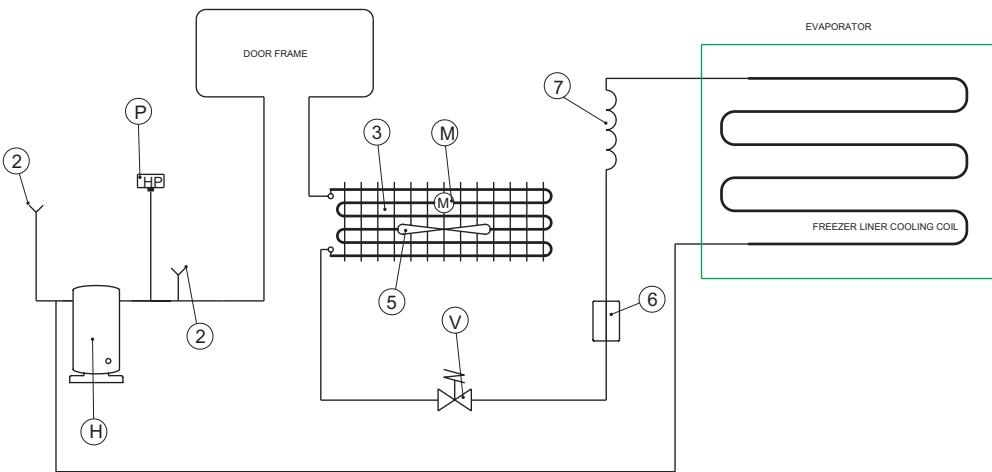
**It would be advisable to contact specialised companies for the disposal and the recycling of the above materials.**

- Divide the remaining parts according to their type and destroy in compliance with the laws in force.
- To remove and transport the machine please refer to the procedure described in the chapters "HANDLING" and "INSTALLATION".

# 14 DIAGRAMS

## 14.1 REFRIGERATOR DRAWING

Angelantoni Industrie S.p.A.  biomedical division		DISEGN. Draw by M.P.	OGGETTO/Object: REFRIGERATING SCHEMA FOR -40°C FREEZERS	N DIS. Drg N° S-F 2624
		CONTROLLATO Inspected		REVISIONE Revision A
		APPROVATO Approved	MATERIALE/Material	FOGLIO / sheet 1 Di of 1
			A TERMINI DI LEGGE CI RISERVIAMO LA PROPRIETÀ DI QUESTO DISEGNO CON DIVIETO DI RIPRODURLO O DI RENDERLO COMUNQUE NOTO A TERZI SENZA LA NOSTRA AUTORIZZAZIONE.	SCALA scale F.S.
			AS BY LAW ENACTED WE RESERVE THE RIGHT OF OWNERSHIP OF DRAWING. THE DOCUMENT AND INFORMATIONS CONTAINED HEREIN MAY NOT BE COPIED, USED OR DISCLOSED WITHOUT OUR PERMISSION.	DATA date 24/08/97
			SE NON DIVERSAMENTE SPECIFICATO TUTTE LE DIMENSIONI SONO IN mm UNLESS NOTED OTHERWISE DIMENSIONS IN mm	ASS SUPER./Sup. Assembly USATO/Used
REVISIONE Revision	DATA / Date A 24/08/97	FIRMA Signature M.P.	DESCRIZIONE/Description EMISSIONE / ISSUE	- TOLLERANZE - LAVORAZIONI MECCANICHE: -ALBERI ..... h -FORI ..... h -ALTRÉ QUOTE .. Js
				UNI 6388 UNI 6390
				-TOLLERANCES- WORK MACHINING: -SHAFTS ..... h -HOSES ..... Js -OTHER DIMENSIONS ..
				UNI 6388 UNI 6390
				A.I. S.p.A. DATA Date 24/08/97 APPROVATO C.Q. Q.C APPROVED FIRMA Signature 



10					
V	LINE SOLENOID VALVE	1			
P	SAFETY PRESSURE SWITCH	1			
7	CAPILLARY PIPE	1			
6	CERAMIC DRIER FILTER	1			
5	PROPELLER BLADE	1			
M	CONDENSER VENTILATION MOTOR	1			
3	CONDENSER	1			
2	PRESSURE CONTROL VALVES	1			
H	HERMETIC COMPRESSOR	1			
POSIZIONE position	DENOMINAZIONE denomination	QUANTITA' quantity	MATERIALI MATERIALS	DIMENSIONI dimensions	NOTE/DISEGANI notes/drawings

Angelantoni Industrie S.p.A.		DISEGN. Draw by M.P.	OGGETTO/Object: REFRIGERATING SCHEMA FOR -85°C FREEZERS	N DIS. Drg N° S-F 2286
		CONTROLLATO Inspected		REVISIONE Revision A
		APPROVATO Approved		SCALA scale F.S.
		MATERIALE/Material		DATA date 24/08/97
		A TERMINI DI LEGGE CI RISERViamo LA PROPRIETÀ DI QUESTO DISEGNO CON DIVETO DI RIPRODURLO O DI RENDERLO COMUNQUE NOTO A TERZI SENZA LA NOSTRA AUTORIZZAZIONE.	AS BY LAW ENACTED WE RESERVE THE RIGHT OF OWNERSHIP OF DRAWING. THE DOCUMENT AND INFORMATION CONTAINED HEREIN MAY NOT BE COPIED, USED OR DISCLOSED WITHOUT OUR PERMISSION.	SE NON DIVERSAMENTE SPECIFICATO TUTTE LE DIMENSIONI SONO IN mm UNLESS NOTED OTHERWISE DIMENSIONS IN mm
				ASS.SUPER./Sup. Assembly USATO/Used

REVISIONE Revision	DATA/Date A 24/08/97	FIRMA Signature M.P.	DESCRIZIONE/Description EMISSIONE / ISSUE	
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- TOLLERANZE -  
LAVORAZIONI MECCANICHE:  
- ALBERI ..... H  
- FORI ..... H  
- ALTRE QUOTE ..... J<sub>s</sub>

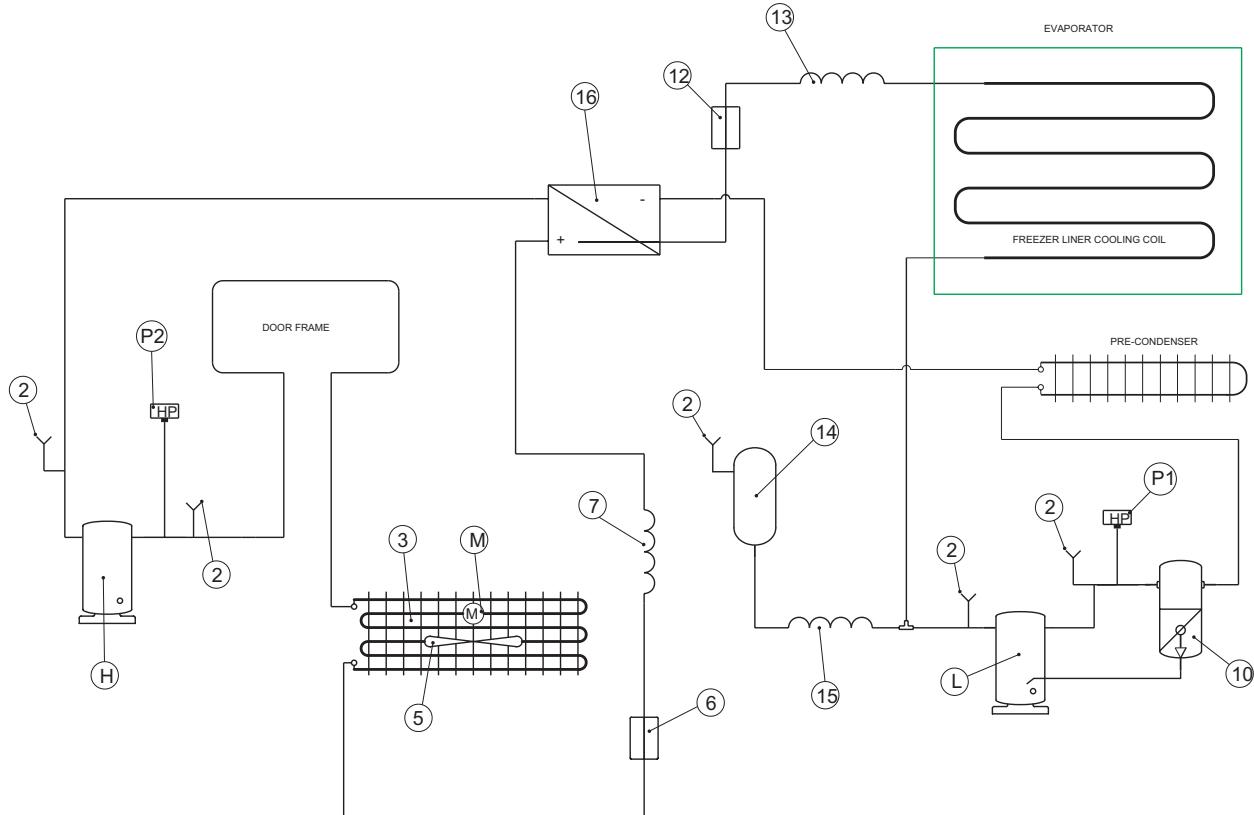
UNI 6388  
UNI 6390

- TOLLERANCES -  
WORK MACHINING:  
SHAFTS ..... H  
HOLES ..... H  
OTHER DIMENSIONS J<sub>s</sub>

UNI 6388  
UNI 6390

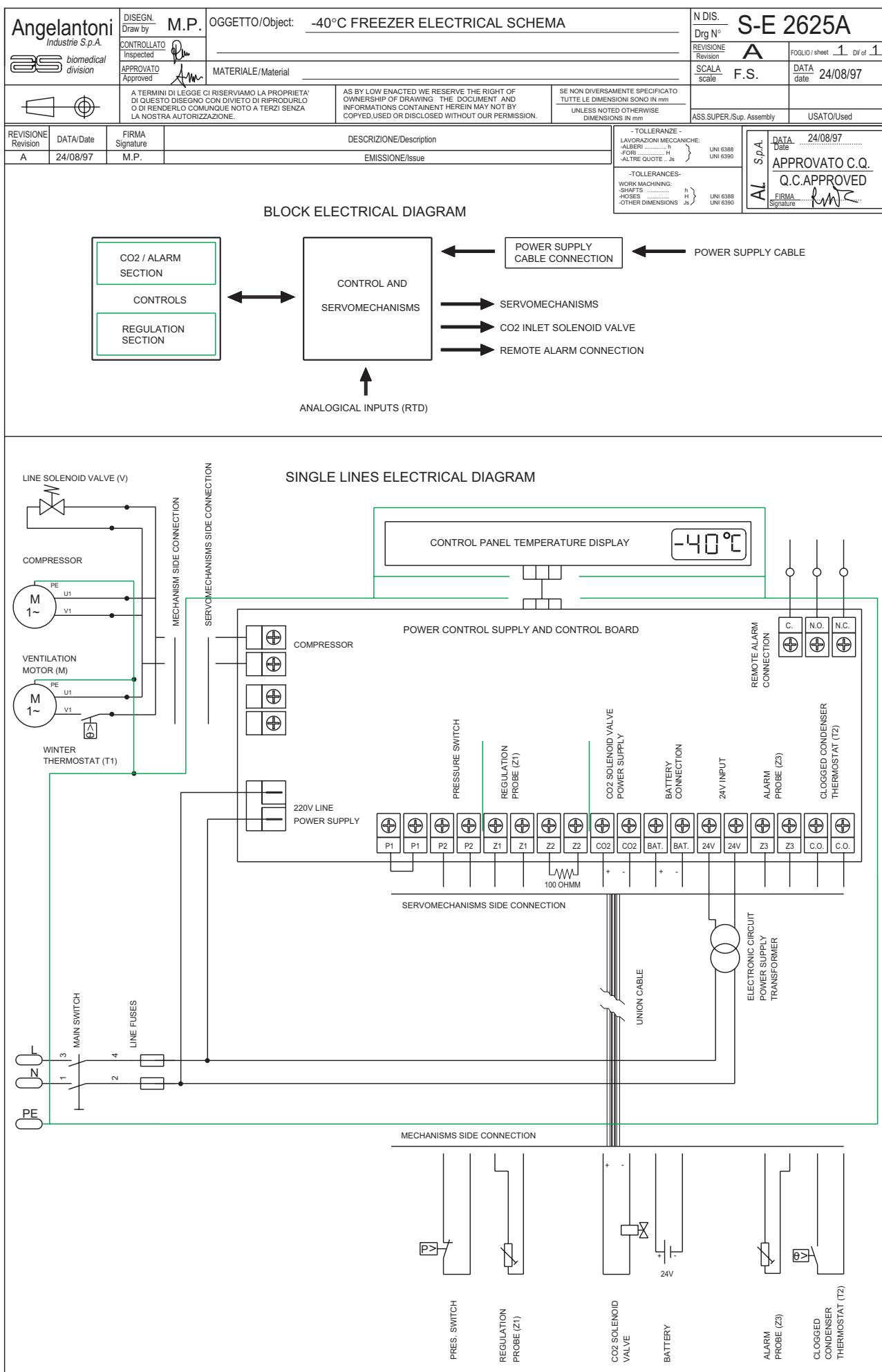
S.p.A. DATA 24/08/97  
FIRMA Signature  
APPROVATO C.Q.  
Q.C APPROVED

A.I. DATA 24/08/97  
FIRMA Signature



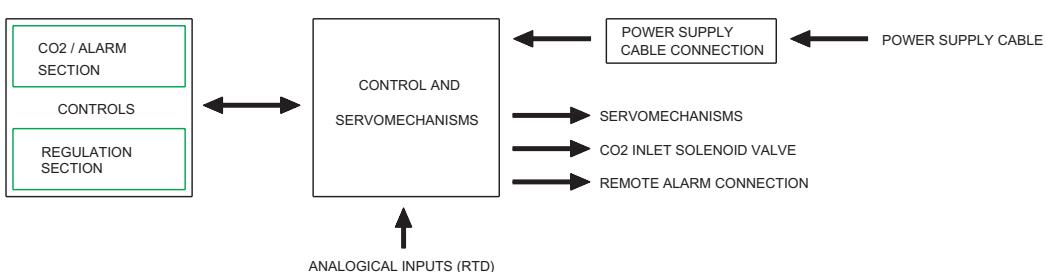
POSIZIONE position	DENOMINAZIONE denomination	QUANTITA' quantity	MATERIALI MATERIALS	DIMENSIONI dimensions	NOTE/DISEGNI notes/drawings
H	1st STAGE COMPRESSOR	1			

## 14.2 ELECTRIC DRAWING

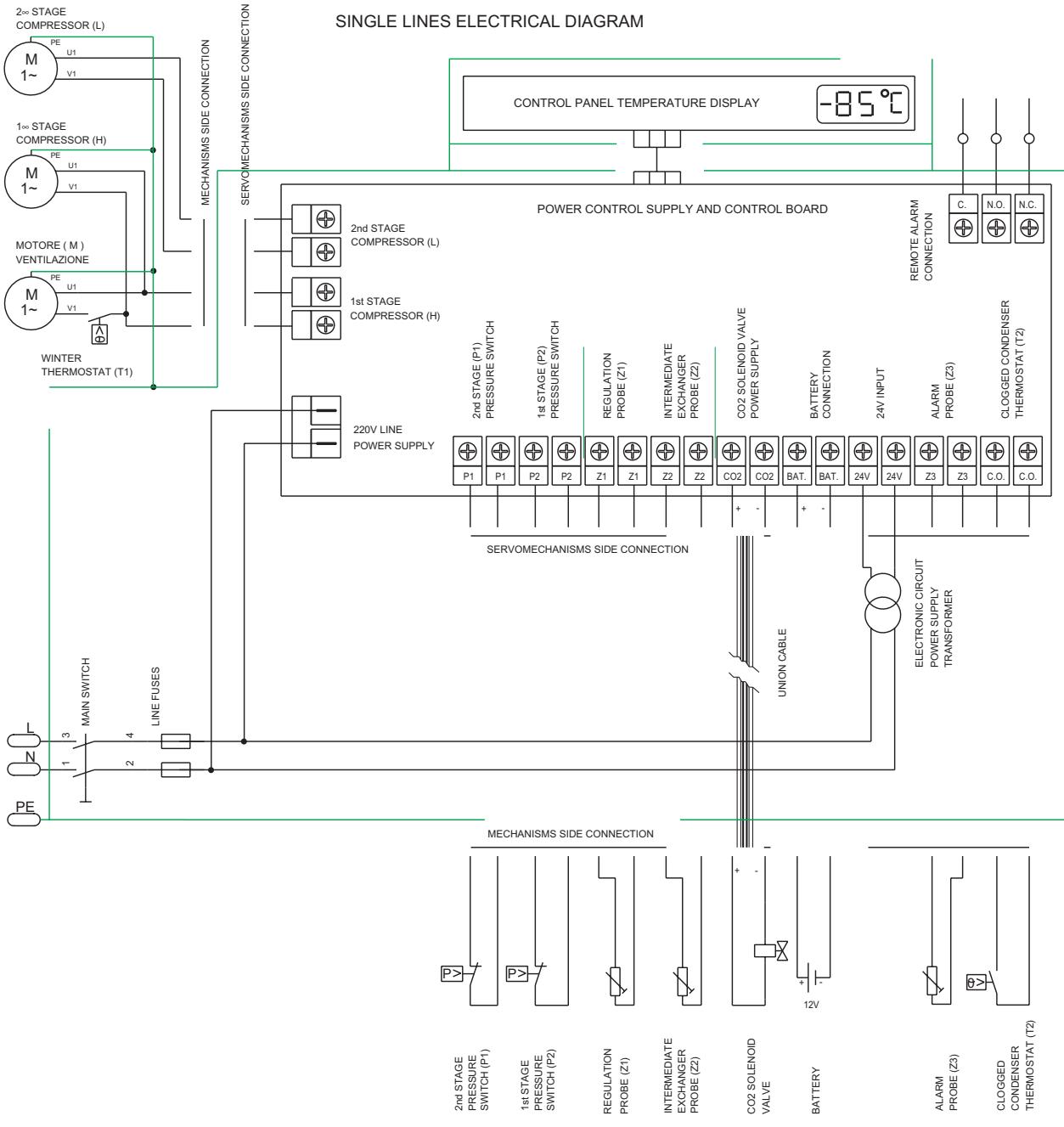


Angelantoni Industria S.p.A.  biomedical division		DISEGN. Draw by M.P.	OGGETTO/Object: -85°C FREEZER ELECTRICAL SCHEMA	N.DIS. Drg N° S-E 2598A
		CONTROLLATO Inspected 		REVISIONE Revision A
		APPROVATO Approved 	MATERIALE/Material	SCALA scale F.S.
		<p>A TERMINI DI LEGGE RIRESERVANO LA PROPRIETÀ DI QUESTO DISEGNO CON DIRITTO DI RIPRODURLO O DI RENDERLO COMUNQUE NOTO A TERZI SENZA LA NOSTRA AUTORIZZAZIONE.</p>		AS BY LAW ENACTED WE RESERVE THE RIGHT OF OWNERSHIP OF DRAWING THE DOCUMENT AND INFORMATIONS CONTAINMENT HEREIN MAY NOT BE COPIED, USED OR DISCLOSED WITHOUT OUR PERMISSION.  SE NON DIVERSAMENTE SPECIFICATO TUTTE LE DIMENSIONI SONO IN mm  UNLESS NOTED OTHERWISE DIMENSIONS IN mm
REVISIONE	DATA/Date	FIRMA	DESCRIZ/ONE/Description	- TOLERANZE -
				
				DATA 24/04/97

## BLOCK ELECTRICAL DIAGRAM



## SINGLE LINES ELECTRICAL DIAGRAM





DNV

# DET NORSKE VERITAS

## QUALITY SYSTEM CERTIFICATE

Certificare No. CERT-000564-95-400-ROM-SINCERT

Si attesta che / This certifies that

IL SISTEMA DI QUALITÀ IN / THE QUALITY SYSTEM OF

**ANGELANTONI INDUSTRIE S.p.A.**

Stabilimenti di Massa Martana (PG) - Italy

Località Climacolle - 06056 Massa Martana (PG) - Italy

È CONFORME AL REQUISITI DELLA NORMATIVA  
CONFORMS TO THE QUALITY SYSTEM STANDARD

UNI EN ISO 9001:2000 (ISO 9001:2000)

Questa certificazione è valida per il seguente campo applicativo:

(Dovever riferimento rispondente al scopo e l'applicazione dei requisiti della normativa o per servizi o servizi).

**Progettazione, costruzione, vendita ed assistenza post-vendita di camere per prove ambientali simulate ed impianti climatici, apparecchiature frigoriferi per processi industriali biomedicale e la ricerca scientifica.**

Design, manufacture, sales and after sales services of simulated environmental test chambers and climatic plants, refrigerating equipment for biomedical applications and scientific research, cooling plants for industrial processes

Luogo e data  
Place and date  
Agrate Brianza, (MI) 2001-01-30

Lead Auditor: GIUSEPPE VIGLIANTE  
Settore EA: 1B

Data Presso Encartatore:

For Issue Date:

Det Norske Veritas Italia S.r.l.

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